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COLUMN WEIGHT DISTRIBUTIONS OF CONVOLUTIONAL CODES

Jean Belzile,
Étudiant Ph.D.

David Haccoun,
Professeur titulaire

École Polytechnique de Montréal

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Column Weight Distributions of Convolutional Codes

Jean Belzile and David Haccoun

Ecole Polytechnique de Montréal
Département de Génie Electrique et de Génie Informatique
Section Communications

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abstract

The breadth-first bidirectional decoding algorithm provides a substantial coding gain over other breadth-first or optimal (Viterbi) algorithms using the same computational effort. However this decoding procedure is highly dependent on the forward and reverse column weight distribution at a given depth in the encoding tree. This column weight distribution is unique for every code in each direction. We give an algorithm for finding this distribution and results for some well known codes are provided.

I. Introduction

For digital communication systems using error control over the discrete memoryless channel, the use of convolutional coding at the transmitting end of the link and either Viterbi or sequential decoding at the receiving end are among the most attractive means of achieving a given error performance. These systems can provide substantial coding gains, while being readily implemented [1–3].

The complexity normally associated with systems using convolutional coding is situated at the receiving end of the transmission, that is, the decoder. In convolutional coding systems, decoding consists essentially of finding a path, called the correct path, in a structured graph, corresponding to a tree or trellis. Several decoding algorithms have been developed to determine this path in the most efficient and/or practical manner. A trellis searching algorithm, the Viterbi algorithm [4], exhaustively searches all states of the trellis and delivers the most likely information sequence given the received symbols. Tree searching sequential decoding algorithms [5–8] use a heuristic and slightly non optimal approach to determine the correct path, while performing far fewer calculations than the Viterbi algorithm. However, by doing so, they introduce an undesirable computational variability.

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Recently breadth-first tree/trellis searching algorithms have been developed in order to achieve a good error performance in real-time. These algorithms [9–12] which use a fixed, or bounded number of paths, rely heavily on the increase of the code's distance profile, or more specifically on the incorrect subset's column weight distribution at a given depth.

The purpose of this paper is to document the incorrect subset's column weight distribution at a given depth for several classes of convolutional codes and to present a new analysis for the path loss problem of breadth-first decoders. Throughout this paper we assume a convolutional code of rate $R=b/V$, and memory ν transmitted over a binary symmetric channel (BSC) with transition probability p and a decoder which performs a multi-path breadth-first search. The decoder can be a bidirectional decoder but it doesn't have to be.

In the next section, we present the algorithm used to find the incorrect subset's column weight distribution, the results of the computer search and the notation introduced to interpret the results. The third section shows how to use this column weight distribution to explain the decoding dynamic of breadth-first decoders. Section IV presents a mathematical model, using a Markov chain approach, that allows a dynamic description of the decoding process described in section III.

II. Search Algorithm and Results

The incorrect subset's column weight distribution is defined as the distribution of the weights of the incorrect subset paths for each tree level. For practical purposes, the results are given until all paths have reached a Hamming distance of d_{free} [13] from the correct path.

To find the column weight distribution of a code, we use a simple and exhaustive tree searching approach which uses a stack to store and order by ascending Hamming distances all examined paths. The search algorithm functions as follows: All the possible codewords at a given depth whose first branch is in error are explored, their Hamming weight are then recorded. A path is eliminated when its Hamming weight exceeds the code's free distance, d_{free} [13]. The search terminates when all paths of Hamming weight less than d_{free} have been visited. The algorithm is given below.

Initialize stack with 1 path at state 0.
Initialize weight/depth table with 0s.
Extend all b-1 non zero branches starting from the root node.

Get top node from stack.

Extend 1 branch from current node.
Add branch weight to accumulated weight.
Increment table of weight/depth.
If state$\neq$0 and Hamming weight $<d_{free}$ then insert node into stack.
Repeat for all b branches.

Repeat until stack empty.

Print results.
Reverse code generators and repeat.

Note that it has been shown in [12, 14, 15] that a bidirectional search of the graph can substantially improve the effectiveness of the available computational complexity and therefore reduce the bit error rate by an order of magnitude over a Viterbi decoder of a comparable complexity. This technique decodes the information in the reverse order and therefore the reverse incorrect subset's column weight distribution is also needed. That is the reason for the last step of the algorithm.

The incorrect subset's column weight distribution for maximum free distance, MFD, codes of memory ν from 2 to 13 and rate R of 1/2, 1/3 and 1/4 [16] and for the rate 1/2 optimum distance profile, ODP, with ν from 1 to 23 [17] are given in appendix A to C and D respectively.

We now introduce the notation used in this paper to analyze the obtained results. Because of the existence of bidirectional decoding algorithms, we are interested in both the forward and reverse column weight distributions at a given tree depth. We define the column weight distribution in one direction of a particular code as the matrix of path weights

$$\mathbf{W} = [w_{lt}], \qquad \begin{matrix} 1 \leq l \leq l_{max} \\ 0 \leq t \leq d_{free} \end{matrix} \tag{1}$$

where d_{free} and l_{max} are, respectively, the free distance of the code and the maximum tree depth required in order for all incorrect paths to have reached this maximum Hamming distance. Each element, w_{lt}, represents the number of paths of weight t at a depth l in the incorrect subtree. Table 1 shows the forward direction matrix W for the maximum free distance R=1/2, ν=6, d_{free}=10 code with generators 133, 171.

Tree Depth (l_d)	Hamming Weight (t)										
	0	1	2	3	4	5	6	7	8	9	10
1			1								
2				2							
3				1	2	1					
4					3	3	1	1			
5					2	3	6	4	0	1	
6					2	1	8	11	6	3	
7					2	0	8	13	18	15	4
8						4	3	19	21	31	28
9						2	6	13	31	50	37
10						1	4	17	28	62	68
11							5	11	30	72	77
12							1	16	21	73	92
13							1	9	23	71	82
14							1	5	19	66	82
15							1	3	13	58	74
16								3	9	43	69
17								2	6	35	44
18									5	26	39
19									3	18	27
20										11	26
21										8	6
22										4	8
23										2	4
24										1	2
25										1	0
26											2

Table 1 Forward incorrect subset's column weight distribution for the Maximum Free Distance R=1/2, ν=6 (133,171) code.

Reading from Table 1, this code has 1 path of weight 2 at depth 1, 2 paths of weight 3 at depth 2 . . . and 69 paths of weight 10 at depth 16.

Using the matrix $\mathbf{W}$ we define the decision length, l_d, of a code as the depth required by a first symbol decoder in order for all the possible decoder paths to have exceeded a Hamming distance of t between any two paths [18]. This depth is given by:

$$l_d(t) = 1 + \max_{l=1}^{l_{max}} (l | w_{lt} \neq 0). \tag{2}$$

Note that l_{max} can now be defined as $l_{max} = l_d(d_{free} - 1)$. We note that the column distance function [19] at depth l, $d_c(l)$, can be defined as

$$d_c(l) = \min_{t=0}^{d_{free}} (t | w_{lt} \neq 0). \tag{3}$$

The distance profile of a code, d, which represents the separation of paths in terms of Hamming distance is defined by successive evaluation of the column distance function $d_c(l)$. The distance profile is defined as a vector containing the first $(\nu + 1)$ evaluations of the column distance function, where ν is the memory of the code [1], that is

$$\mathbf{d} = \{d_c(1), d_c(2), \ldots, d_c(\nu + 1)\}. \tag{4}$$

For example, the convolutional code of Table 1 has a forward distance profile of {2,3,3,4,4,4,4}.

The results presented in the appendices are a generalization of those in [18]. They give not only the distance required to obtain a certain error correcting capability but also the number of paths a breadth-first decoder must keep to guaranty that error correcting capability. We will see in the next sections how to use these tables to arrive at those results.

III. Decoder Dynamics

Given a incorrect subset's column weight distribution per tree depth of a code, we now show how to calculate the number of errors, *t*, that can be decoded by a multi-path breadth-first decoder for a given value of M without correct path loss. The decoder will lose the correct path if M becomes insufficient to correct the number of errors delivered by the channel.

To study the impact of a received error event from the channel, we identify three decoder conditions: stable, unstable and lost. The *stable* condition is characterized by a deterministic path distribution calculated from the column weight distribution. The *unstable* condition is when the correct path is still among the M extended paths but when the situation is not *stable*, that is, the column weight distribution is not the same as in the *stable* condition. The decoder enters the *lost* condition when the correct path is no longer among the M extended paths.

With reference to the received branches, we also define two channel states: calm and noisy. The channel is said to be *calm* when the current branch is received without any errors. By opposition, the channel is said to be *noisy* when the current branch is received with at least one symbol in error.

From these definitions we can identify four different cases for the analysis:

1. When the decoder is *stable* (the channel is always calm).
2. When the decoder is *unstable* and the channel becomes *noisy*.
3. When the decoder is *unstable* and the channel starts a *calm* period.
4. When the decoder is *lost*.

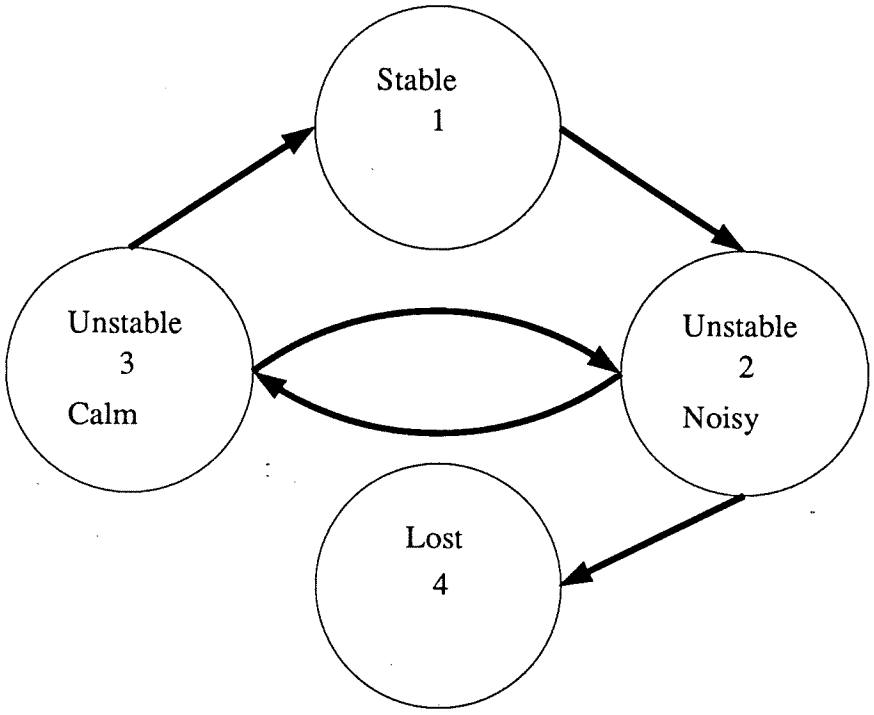

Figure 1 Illustration of the transitions between the different cases.

From these four cases we can construct a behavior model of the decoding process. The diagram of Figure 1 illustrates the possible transitions among the cases.

At the start, and until the first channel error, the decoding proceeds as in the first case. The second case is encountered when a channel error occurs. The minimum number of paths required to correct the new channel error is calculated here. When the channel becomes quiet again the decoder proceeds to case 3 where it will stay until either the decoder becomes stable, or a new channel error occurs. While in the second case, if the number of paths needed to keep the correct path exceeds M then there is a non zero probability that the decoder will go to the fourth case and lose the correct path.

We will now examine more closely each of these four cases. However we must keep track of two quantities: the number of errors, t, accumulated since the last time the decoder was stable, and the number of tree depths, c, explored since that time. Note that c represents the current depth in the incorrect subtree.

Decoder *stable* This state represents the decoder behavior in a noiseless channel. Here t and c are always 0 by definition. Since there is no noise on the channel the decoding is always

correct and only M=1 path is required to decode correctly the received information. However it is important to study the column distribution when M>1.

We define t_{stable} as the maximum potential error correcting capability of the decoder. It is the largest Hamming distance between at least 1 incorrect path and the correct path when the decoder is in the stable state. We also define $l_{d_{stable}}$ as the maximum backward depth after which all paths will have merged while the decoder is in the stable state. Normally $l_{d_{stable}}$ is given by $l_{d_{stable}} = l_d(t_{stable})$, however these two characteristics can be calculated jointly by

$$M \geq 1 + \sum_{i=0}^{t_{stable}} \sum_{l=1}^{l_{d_{stable}}} w_{li}. \tag{5}$$

Note that the sum runs along the columns of **W** first. If the sum in (5) is strictly smaller than M, then some paths will have distance $t_{stable} = t_{stable} + 1$ from the correct path and the maximum decision depth will be $l_{d_{stable}} = d_l(t_{stable} + 1)$. For the code given in Table 1 and M=64, the maximum decision depth, $l_{d_{stable}}$, is 15 and the maximum potential error correcting capacity, t_{stable}, is 6 since the sum after the first six columns, column 5, is 30 and the sum after the first seven columns, column 6, is 75.

Decoder *unstable*, **channel** *noisy* This case occurs immediately after a channel error; any channel error will cause the decoder to become unstable. When entering this state, the number of channel errors, t, since leaving state 1 for the last time is incremented by the number of channel transitions on this branch (1-V). The number of tree depths explored since leaving the stable state, c, is incremented by 1.

Upon each entry in this state, the decoder has to verify whether a sufficient number of paths are being explored in order for the decoder not to loose the correct path. To perform this calculation, we need to define two key boundaries M_{req} and M_{loss}. M_{req} is the minimum number of paths that must be kept in order to guaranty the presence of the correct path. If $M \geq M_{req}$ then a sufficient number of paths is being explored for the correct path to remain among the explored paths. M_{loss} is the minimum number of paths required for the decoder to have a chance of pursuing the correct path. If $M_{loss} \geq M$ then the decoder will certainly loose the correct path and enter the lost state.

The number of paths required to correct t errors, M_{req}, is given by

$$M_{req} = 1 + \max_{l=c}^{l_{d(2t)}} \sum_{i=t}^{2t} w_{li} \tag{6}$$

where c is the current depth in the incorrect subtree and t is the total number of channel errors on these branches.

The number of paths after which the decoder will certainly loose the correct path M_{loss} is given by

$$M_{loss} = 1 + \max_{l=c}^{l_{d(2t)}} \sum_{i=t}^{2t-1} w_{li}. \tag{7}$$

The correct path will certainly loose the correct path and fall in the fourth case since there exists more than M paths that are less than t errors away from the received sequence.

However if $M_{loss} \leq M < M_{req}$ then the proportion of the M paths that are susceptible to keep the correct path with respect to the number of paths at distance $2t$ is given by

$$r(l) = \frac{M - \sum_{i=t}^{2t-1} w_{li}}{w_{l,2t}} \tag{8}$$

however there maybe several tree depths l for which $r(l) < 1$. The probability of loosing the correct path is therefore given by

$$(P_{loss}|M_{loss} < M < M_{req}) = 1 - \prod_{l} r(l). \tag{9}$$

where the product is taken over the range of tree depths where $r(l) < 1$.

Decoder *instable*, channel *calm* This is case occurs on the first branch where no channel errors occurred. At this point the correct path is not necessarily the best path. We would like the decoder to stay in this state until it reaches a stable state (case 1).

The amount of time required by the decoder for the correct path to be the best path is given by $l_d(2t)$ where t is the number of errors accumulated on the channel since the last passage into case 1. However, at that point the other paths are not necessarily the paths that are required for the decoder to be *stable*. In order to achieve the requirements for case 1, the decoder needs to stay in this state until the 'incorrect paths' have reached Hamming distance t_{stable} from the correct path. This will be guaranteed after

$$l_d(2t + t_{stable}) \tag{10}$$

more tree depths.

Decoder *lost* When the decoder looses the correct path, the channel automatically appears to be noisy. We conjecture, and simulations concur, that when the memory of the code is large the probability of the decoder merging back with the correct path tends toward 0, [15]. The resulting bit error rate from the decoder will be about 50%, that is, decoding becomes totally random.

IV. Mathematical Model

From the behavior model presented above, it is possible to represent the decoding process by a Markov chain. An example is given in Figure 2.

In this chain we can see that the first case is represented by a single state labeled *stable* where the decoder stays until a transition occurs on the channel. The fourth case is also represented by a single state, the *lost* state. There is no way out of that state once it has been reached. The unstable cases, cases 2 and 3, have been expanded. The second case has been expanded horizontally while the third case was expanded vertically. For each symbol where a channel transition occurs, the decoder moves to the right. For each correctly received symbol the decoder goes down one level.

In Figure 2 the horizontal transitions between unstable states show the presence of noise on the channel while the vertical transitions between the same states show an absence of noise on the channel. Therefore the transition probabilities along the horizontal axis would be the transition probability of the channel, p in the case of a BSC. Conversely the transition probabilities on the vertical axis are $1-p$.

We see that the Markov chain closely follows the results presented earlier. The decoder always starts in the stable state, and stays there until a channel error occurs. It returns to that state if the channel stays calm for a sufficient amount of time. On the other hand, it reaches the loss state if the channel produced too many errors in too short a time. The decoder will stay in that state for a very long time if $\nu$is large enough.

In the example given, if 4 consecutive channel error then the decoder will enter the lost state, however if the decoder receives 1 channel error then 4 correct symbols then it will come back to the stable state and stay there until a new channel error.

V. Conclusions

In this paper we defined the incorrect subset's column weight distribution of a convolutional code as the distribution of the weight of the codewords at a certain depth in the encoding graph. Using this definition we have been able to construct an algorithm which exhaustively searches for the weight of all codewords up to a certain tree depth.

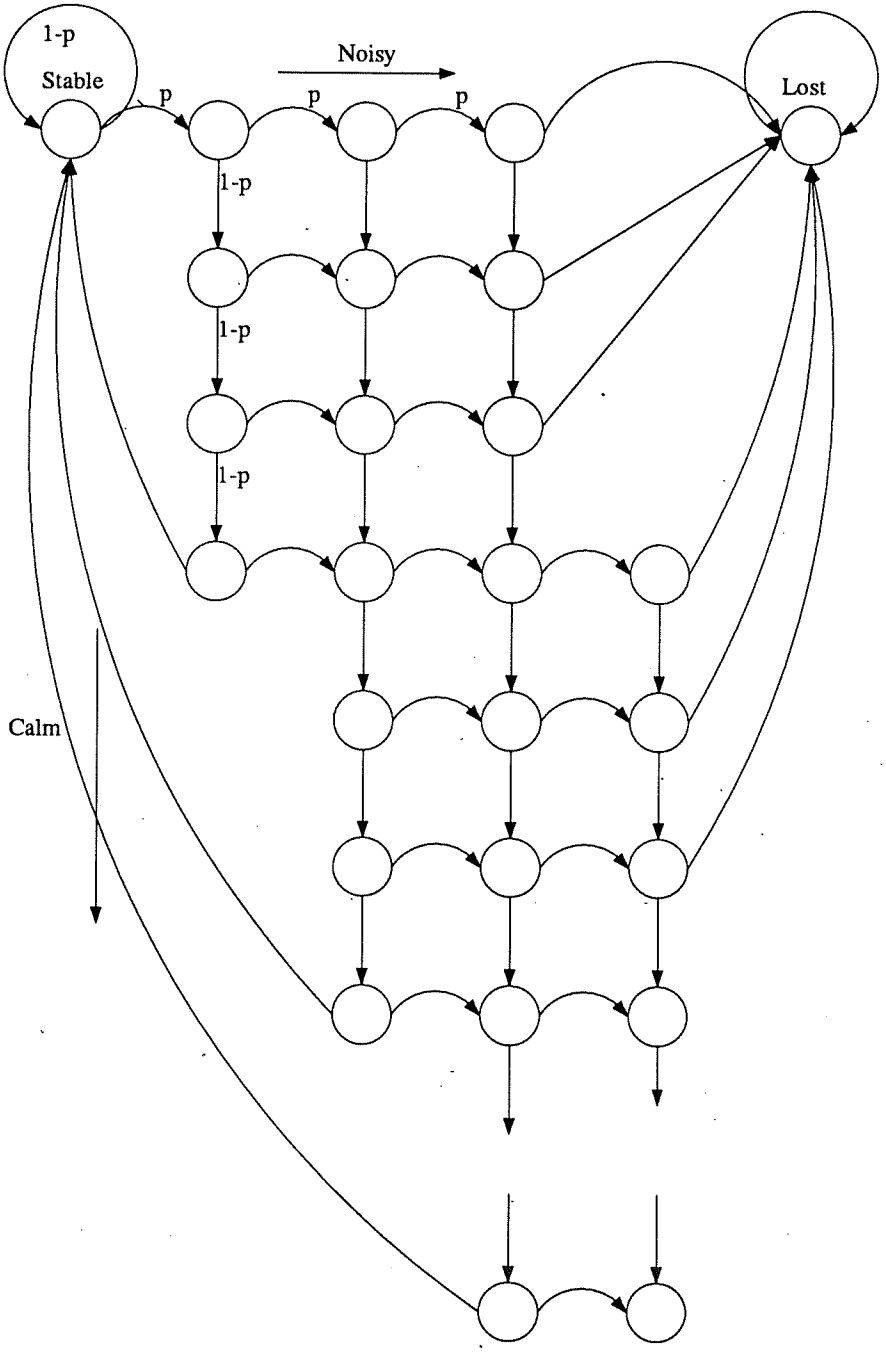

Figure 2 Markov chain for the path loss probability calculations.

Using this procedure we have calculated the forward and reverse column weight distributions for rates R=1/2, 1/3 and 1/4 MFD codes whose memory, ν, is smaller than 14. The R=1/2 ODP for memory up to 23 have also been investigated. The results for these codes can be found in appendix A to D.

Using these results, a model of a breadth-first decoder was proposed to explain the dynamics of such a decoder. Using this model, expressions for the number of paths as well as the tree depth required to clear a certain amount of noise have been found. These expressions permit a simulator to calculate the path loss probability as well as the bit error rate for a fixed number of paths without performing the actual decoding.

In the last section the model was translated into a Markov chain model that could be used to calculate the path loss probability.

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APPENDICES

In the following appendices, the column weight distributions are given as follows. The first column gives the tree depth. The numbers in parentheses indicate the number of paths having Hamming weight d_{free} and an all 0 state at that depth. Note that the number of paths at d_{free} having state 0 is the same in both the forward and reverse directions and that their positions are identical. This is because the spectrum of the code is the same in forward and in reverse explorations.

The second column indicates the minimum path weight found at this depth for both the forward and reverse explorations, the upper number being the forward exploration and the lower one the reverse exploration. These numbers represent the column distance function for forward and reverse explorations.

The third column gives the number of paths having Hamming weight starting at the value in column 2, incrementing by one for each succeeding weight. Again the top line represents the forward exploration and the bottom one the reverse exploration.

Appendix A Maximum Free Distance R=1/2 Codes

This appendix contains the forward and reverse column weight distributions for the maximum free distance (MFD) convolutional codes of rate R=1/2 and memory ν=2 to 13.

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3(1)	3	[1,2,1]
	3	[1,2,1]
4	4	[3,2]
	4	[3,2]
5	4	[1,4]
	4	[1,4]
6	5	[2]
	5	[2]

Figure 3 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=2, d_{free}=5, (5,7) code.

1	2	[1]
	2	[1]
2	2	[1,0,1]
	3	[2]
3	3	[2,0,2]
	3	[1,2,1]
4	4	[4,2]
	4	[3,3,1]
5(1)	4	[2,5,4]
	4	[2,3,6]
6	4	[1,4,7]
	5	[6,2]
7	5	[5,2]
	5	[3,6]

Figure 4 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=3, d_{free}=6, (15,17) code. (Continued . . .)

8	5	[1,8]
	6	[6]
9	6	[2]
		[]

Figure 4 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=3, d_{free}=6, (15,17) code.

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3	3	[1,2,1]
	3	[1,2,1]
4	3	[1,1,3,3]
	4	[3,3,1,1]
5(1)	3	[1,1,2,6,5]
	4	[2,3,6,3]
6	4	[2,3,5,7]
	4	[2,1,8,9]
7	4	[1,3,8,5]
	5	[5,4,9]
8(1)	4	[1,1,9,9]
	5	[2,8,6]
9	5	[2,6,10]
	5	[1,5,11]
10	5	[1,5,7]
	5	[1,2,7]
11	6	[5,4]
	6	[3,2]

Figure 5 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=4, d_{free}=7, (23,35) code. (Continued . . .)

12	6	[2,6]
	6	[1,4]
13	7	[4]
	7	[2]

Figure 5 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=4, d_{free}=7, (23,35) code.

16	8	[4]
	7	[1,2]
17		[]
	8	[2]

Figure 6 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=5, d_{free}=8, (53,75) code.

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3	3	[1,2,1]
	3	[1,2,1]
4	3	[1,1,3,3]
	3	[1,1,3,3]
5	4	[2,4,4,4,2]
	3	[1,1,2,6,5,1]
6	4	[1,4,7,8,6]
	3	[1,1,2,6,9,9]
7	4	[1,2,8,14,11]
	4	[2,3,4,13,12]
8(1)	5	[2,9,14,17]
	4	[1,3,7,13,12]
9	5	[1,8,12,24]
	5	[4,6,12,22]
10	5	[1,3,18,13]
	5	[2,7,14,15]
11	5	[1,2,12,20]
	6	[6,18,14]
12	6	[3,7,15]
	6	[3,14,23]
13	6	[2,3,14]
	6	[1,10,17]
14	7	[5,4]
	7	[5,14]
15	7	[2,6]
	7	[2,6]

Figure 6 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=5, d_{free}=8, (53,75) code. (Continued . . .)

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3	3	[1,2,1]
	3	[1,2,1]
4	4	[3,3,1,1]
	3	[1,1,3,3]
5	4	[2,3,6,4,0,1]
	4	[2,4,4,4,2]
6	4	[2,1,8,11,6,3]
	4	[1,4,7,8,7,4,1]
7(1)	4	[2,0,8,13,18,15,4]
	5	[3,11,11,11,17,8]
8(1)	5	[4,3,19,21,31,28]
	5	[2,7,19,23,23,24]
9(1)	5	[2,6,13,31,50,37]
	5	[1,6,16,34,48,30]
10(2)	5	[1,4,17,28,62,68]
	6	[6,12,34,74,58]
11(2)	6	[5,11,30,72,77]
	6	[2,14,34,71,94]
12(1)	6	[1,16,21,73,92]
	6	[1,10,28,81,87]
13(1)	6	[1,9,23,71,82]
	6	[1,5,25,73,96]
14(1)	6	[1,5,19,66,82]
	7	[2,24,63,78]
15	6	[1,3,13,58,74]
	7	[1,11,67,63]

Figure 7 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=6, d_{free}=10, (133,171) code. (Continued . . .)

16(1)	7	[3,9,43,69]
	7	[1,8,40,76]
17	7	[2,6,35,44]
	8	[4,33,40]
18	8	[5,26,39]
	8	[1,20,39]
19	8	[3,18,27]
	8	[1,10,21]
20	9	[11,26]
	8	[1,6,9]
21	9	[8,6]
	9	[3,10]
22	9	[4,8]
	9	[2,2]
23	9	[2,4]
	9	[1,2]
24	9	[1,2]
	10	[2]
25	9	[1,0]
		[]
26	10	[2]
		[]

Figure 7 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=6, d_{free}=10, (133,171) code.

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3	3	[1,2,1]
	3	[1,2,1]
4	3	[1,1,3,3]
	3	[1,1,3,3]
5	4	[2,4,4,4,2]
	4	[2,4,4,4,2]
6	4	[1,4,7,8,7,4,1]
	4	[1,4,7,8,7,4,1]

Figure 8 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=7, d_{free}=10, (247,371) code. (Continued . . .)

7	5	[4,8,12,16,12,8]
	4	[1,2,8,14,14,14,7]
8	5	[2,8,16,24,28,20]
	5	[2,9,14,24,30,19]
9(1)	5	[1,6,17,32,46,40]
	5	[1,5,22,28,38,53]
10	5	[1,3,15,37,62,64]
	6	[4,18,37,57,53]
11	6	[4,10,32,82,76]
	6	[1,16,37,70,82]
12	6	[3,6,30,82,91]
	6	[1,8,35,80,90]
13	6	[3,4,22,69,109]
	6	[1,5,24,77,105]
14	7	[8,14,62,76]
	6	[1,3,16,67,89]
15	7	[3,17,51,63]
	6	[1,1,12,58,63]
16	8	[13,49,51]
	7	[2,8,42,62]
17	8	[8,38,50]
	7	[1,6,29,48]
18	8	[4,27,42]
	8	[5,18,37]
19	8	[2,17,30]
	8	[1,16,21]
20	9	[12,18]
	8	[1,9,15]
21	9	[7,10]
	8	[1,5,9]
22	9	[1,12]
	9	[3,8]
23	10	[2]
	9	[2,2]
24	9	[]
	10	[4]

Figure 8 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=7, d_{free}=10, (247,371) code.

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3	3	[1,2,1]
	3	[1,2,1]
4	4	[3,3,1,1]
	4	[3,3,1,1]
5	4	[1,6,4,2,3]
	4	[2,3,6,4,0,1]
6	5	[5,9,6,6,5,1]
	5	[6,6,8,8,2,2]
7	5	[3,8,15,16,9,8,5]
	5	[3,9,13,15,13,7,3,1]
8	5	[1,8,18,24,28,24,14,8]
	5	[2,6,18,26,26,26,14,6]
9(1)	6	[6,18,32,48,52,44,28]
	6	[7,17,30,50,52,44,31]
10(1)	6	[3,15,37,65,90,98,70]
	6	[5,12,33,74,90,88,76]
11(2)	6	[2,10,32,82,130,164,148]
	6	[2,12,32,73,136,173,132]
12(1)	7	[10,26,70,176,256,210]
	6	[1,10,23,75,170,251,234]
13(3)	7	[7,18,64,184,333,338]
	7	[7,23,61,174,341,323]
14(2)	7	[4,16,50,165,393,415]
	7	[4,19,51,164,384,415]
15	7	[3,10,41,149,378,479]
	8	[18,46,140,383,462]
16(1)	7	[1,11,29,112,368,459]
	8	[7,49,115,352,466]
17	7	[1,4,31,88,303,436]
	8	[3,32,111,319,400]
18	7	[1,3,19,77,250,358]
	8	[1,22,87,272,400]
19	7	[1,1,14,61,209,288]
	9	[12,71,226,319]
20	8	[2,8,45,178,231]
	9	[5,52,181,270]
21	8	[1,7,32,133,205]
	9	[3,28,150,204]

Figure 9 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=8, d_{free}=12, (561,753) code. (Continued . . .)

22	9	[5,23,104,147]
	9	[1,20,97,172]
23	9	[3,19,72,117]
	9	[1,9,74,101]
24	9	[1,12,55,88]
	10	[5,49,77]
25	10	[7,41,61]
	10	[2,29,54]
26	10	[4,24,50]
	11	[22,22]
27	10	[3,15,25]
	11	[12,20]
28	10	[2,8,20]
	11	[5,14]
29	10	[2,4,10]
	11	[1,8]
30	10	[1,4,5]
	12	[2]
31	11	[4,4]
		[]
32	11	[1,6]
		[]
33	12	[2]
		[]

Figure 9 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=8, d_{free}=12, (561,753) code.

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3	3	[1,2,1]
	3	[1,2,1]
4	3	[1,1,3,3]
	4	[3,3,1,1]
5	4	[2,4,4,4,2]
	4	[2,3,6,4,0,1]

Figure 10 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=9, d_{free}=12, (1167,1545) code. (Continued . . .)

6	4	[1,4,7,8,7,4,1]
	5	[6,6,8,8,2,2]
7	5	[3,11,11,11,17,9,1,1]
	5	[3,9,13,15,13,7,3,1]
8	5	[1,10,17,21,27,25,19,6]
	6	[11,18,18,30,28,14,5]
9	6	[8,16,33,48,44,48,35]
	6	[5,22,30,42,56,46,31]
10	6	[2,22,34,58,92,92,72]
	6	[2,18,37,61,92,92,77]
11	6	[2,11,38,80,120,163,140]
	6	[2,9,36,80,128,167,132]
12	6	[2,4,34,89,146,242,238]
	6	[1,6,30,78,162,255,227]
13	6	[2,2,23,78,181,319,304]
	6	[1,4,17,80,172,316,354]
14	6	[1,2,18,59,181,381,408]
	6	[1,3,11,60,172,374,404]
15(1)	6	[1,1,15,40,160,407,474]
	6	[1,2,10,38,152,399,451]
16	6	[1,0,9,44,108,407,470]
	6	[1,1,8,32,113,375,476]
17	6	[1,0,7,31,93,339,471]
	7	[3,4,27,83,317,451]
18	7	[2,4,21,83,261,417]
	7	[1,7,15,72,266,341]
19	7	[1,4,18,54,239,294]
	8	[6,14,55,203,319]
20	7	[1,2,15,44,180,276]
	8	[1,16,44,169,219]
21	8	[3,10,35,144,204]
	9	[10,38,136,192]
22	8	[1,9,29,108,168]
	9	[5,30,107,160]
23	9	[6,25,88,119]
	9	[3,16,91,122]
24	9	[3,19,69,105]
	9	[1,11,61,105]
25(1)	9	[2,10,54,86]
	10	[9,43,59]
26	9	[1,5,44,53]
	10	[4,27,56]

Figure 10 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=9, d_{free}=12, (1167,1545) code. (Continued . . .)

27	9	[1,1,32,43]
	10	[2,17,30]
28	10	[3,15,35]
	10	[1,9,21]
29	10	[2,9,18]
	10	[1,6,7]
30	10	[2,3,14]
	11	[5,6]
31	11	[5,4]
	11	[3,4]
32	11	[3,4]
	11	[2,2]
33	11	[1,4]
	11	[1,2]
34	11	[1,0]
	12	[2]
35	12	[2]
		[]

Figure 10 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=9, d_{free}=12, (1167,1545) code.

1	2	[1]
	2	[1]
2	3	[2]
	2	[1,0,1]
3	3	[1,2,1]
	3	[2,0,2]
4	4	[3,3,1,1,]
	4	[4,2,0,2]
5	4	[2,3,6,4,0,1]
	4	[2,5,4,2,2,1]
6	5	[6,6,8,8,2,2]
	4	[1,5,6,10,5,1,4]
7	5	[3,9,13,15,13,7,3,1]
	5	[5,7,13,19,7,5,7,1]
8	6	[11,18,18,30,28,14,6,2,1]
	5	[3,7,17,27,27,21,11,9,6]

Figure 11 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=10, d_{free}=14, (2335,3661) code. (Continued . . .)

9	6	[6,18,35,42,50,54,28,14,7]
	5	[2,5,18,36,44,54,44,20,18,13]
10	6	[5,9,41,72,79,98,90,64,31]
	5	[1,4,16,40,63,88,104,80,47,30]
11(1)	6	[3,7,38,73,136,174,161,186,108]
	6	[3,14,40,75,125,177,184,158,88]
12(1)	6	[3,2,33,71,167,263,308,358,253]
	7	[13,37,79,159,254,326,350,262]
13(1)	6	[1,6,13,88,150,332,523,600,521]
	7	[6,34,79,175,340,484,617,535]
14(2)	6	[1,3,12,64,171,347,669,1015,839]
	7	[2,24,81,181,372,676,979,843]
15(1)	7	[3,9,50,147,386,763,1334,1375]
	8	[16,64,190,403,776,1383,1316]
16(2)	7	[1,9,32,137,355,836,1651,1684]
	8	[7,55,151,427,922,1630,1772]
17(2)	7	[1,7,21,101,336,858,1819,2070]
	8	[3,36,131,400,959,1923,2137]
18(3)	7	[1,4,16,76,292,802,1905,2306]
	9	[26,100,338,966,2120,2380]
19(2)	8	[5,10,56,226,751,1878,2312]
	9	[13,77,279,869,2209,2588]
20(3)	8	[1,14,42,155,655,1785,2268]
	9	[4,57,228,731,2127,2646]
21	9	[9,28,155,463,1654,2097]
	9	[2,37,162,613,1944,2470]
22(2)	9	[5,18,118,416,1316,1932]
	9	[2,20,117,484,1658,2280]
23	9	[2,13,88,319,1151,1510]
	9	[1,12,84,357,1361,1939]
24(1)	9	[1,8,61,247,944,1311]
	10	[6,50,295,1072,1501]
25(1)	9.	[1,3,44,186,729,1103]
	10	[3,33,192,869,1211]
26	10	[4,18,154,569,808]
	10	[1,21,129,641,970]
27	10	[1,16,93,453,640]
	10	[1,9,89,461,702]
28	10	[1,6,67,305,542]
	11	[4,57,327,499]
29	10	[1,2,47,204,360]
	12	[29,231,357]

Figure 11 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=10, d_{free}=14, (2335,3661) code. (Continued . . .)

30	11	[4,24,164,200]
	12	[17,134,259]
31	11	[1,13,123,159]
	12	[6,89,140]
32	11	[1,6,66,150]
	12	[3,48,97]
33	12	[6,37,70]
	12	[1,24,57]
34	12	[4,25,36]
	13	[12,28]
35	12	[3,15,27]
	13	[5,14]
36	13	[13,16]
	13	[2,6]
37	13	[6,14]
	13	[1,2]
38	13	[1,10]
	14	[2]
39	14	[2]
		[]

Figure 11 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=10, d_{free}=14, (2335,3661) code.

1	2	[1]
	2	[1]
2	2	[1,0,1]
	3	[2]
3	3	[2,0,2]
	3	[1,2,1]
4	4	[4,2,0,2]
	4	[3,3,1,1]
5	4	[2,5,4,2,2,1]
	4	[2,3,6,4,0,1]
6	4	[1,4,10,5,5,6,0,1]
	4	[2,1,8,11,6,3,0,1]
7	5	[5,6,17,14,7,10,3,2]
	5	[5,4,15,18,11,8,1,2]

Figure 12 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=11, d_{free}=15, (4335,5723) code. (Continued . . .)

8	5	[4,4,18,32,22,20,14,8,6]
	5	[3,6,13,29,31,21,15,7,2,1]
9	5	[2,6,15,36,52,48,38,28,18,10,3]
	6	[9,15,27,50,56,48,28,14,7,1]
10	5	[1,4,17,37,63,96,98,74,55,36,20]
	6	[6,12,35,64,89,104,86,64,32,12]
11	5	[1,2,13,39,76,127,178,190,145,104,71]
	6	[5,6,37,74,123,180,183,172,123,66]
12(1)	6	[3,8,34,87,152,257,341,342,299,176]
	6	[1,13,20,84,151,243,346,346,335,206]
13	6	[1,8,26,82,183,314,506,656,649,468]
	7	[6,30,69,156,321,494,637,700,493]
14(1)	6	[1,5,20,69,190,386,649,995,1246,953]
	7	[3,22,64,165,349,657,967,1197,1075]
15(1)	7	[4,14,62,177,404,805,1344,1957,1730]
	7	[3,11,56,153,385,756,1303,1918,1651]
16(2)	7	[3,8,48,166,396,895,1693,2711,2642]
	8	[8,49,141,350,849,1615,2603,2618]
17(1)	7	[2,8,30,133,389,931,1960,3478,3533]
	8	[4,27,145,321,821,1889,3298,3427]
18(2)	7	[2,4,22,109,342,909,2097,4166,4501]
	8	[1,20,101,317,803,1926,3971,4205]
19(2)	8	[5,17,75,296,867,2100,4603,5289]
	9	[11,71,284,733,1951,4337,4882]
20(4)	8	[5,10,57,228,755,2101,4842,5601]
	9	[5,46,226,678,1830,4541,5265]
21	8	[3,8,45,171,637,1926,4874,5923]
	9	[3,31,147,607,1680,4469,5450]
22	8	[2,4,33,144,513,1656,4728,5792]
	9	[2,20,107,428,1595,4200,5256]
23(2)	8	[2,3,27,94,416,1416,4285,5565]
	9	[2,9,75,343,1255,3923,5002]
24(1)	8	[1,4,19,69,330,1118,3857,4933]
	9	[1,8,48,239,1022,3365,4591]
25(1)	8	[1,3,13,59,229,972,3109,4518]
	9	[1,4,30,179,775,2811,3884]
26	8	[1,2,13,46,169,741,2596,3711]
	10	[3,18,120,603,2268,3155]
27	8	[1,2,8,34,151,565,2083,3001]
	10	[1,11,83,442,1761,2601]

Figure 12 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=11, d_{free}=15, (4335,5723) code. (Continued . . .)

28	8	[1,0,8,29,103,471,1676,2344]
	11	[7,52,314,1367,1967]
29	9	[2,1,28,78,352,1388,1876]
	11	[2,44,187,1047,1517]
30	10	[5,19,56,272,1069,1607]
	11	[1,22,142,737,1129]
31	10	[3,10,58,205,807,1235]
	12	[15,89,521,813]
32	10	[2,6,40,166,642,908]
	12	[6,67,344,575]
33	10	[1,5,26,119,524,716]
	12	[3,41,232,393]
34	10	[1,4,15,92,394,580]
	12	[1,20,158,266]
35	11	[4,10,67,298,431]
	13	[8,113,152]
36	11	[2,9,49,208,347]
	13	[3,68,113]
37	12	[8,30,162,236]
	13	[1,36,73]
38	12	[2,29,103,191]
	14	[20,36]
39	12	[2,16,78,122]
	14	[6,28]
40	12	[2,9,54,89]
	14	[1,10]
41	12	[1,5,45,47]
	15	[2]
42	13	[3,28,51]
		[]
43	14	[20,28]
		[]
44	14	[9,22]
		[]
45	14	[3,12]
		[]
46	15	[6]
		[]

Figure 12 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=11, d_{free}=15, (4335,5723) code.

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3	3	[1,2,1]
	3	[1,2,1]
4	3	[1,1,3,3]
	4	[3,3,1,1]
5	4	[2,4,4,4,2]
	4	[1,6,4,2,3]
6	4	[1,4,7,8,7,4,1]
	4	[1,3,8,10,5,3,2]
7	4	[1,2,8,14,14,14,8,2,1]
	4	[1,1,9,15,13,15,7,1,2]
8	5	[2,9,14,24,30,22,18,8,0,1]
	4	[1,0,8,16,24,32,22,16,7,0,2]
9	5	[1,5,22,28,38,62,48,28,17,5,2]
	4	[1,0,7,10,34,58,44,46,35,14,5,0,2]
10	5	[1,3,15,40,59,82,106,92,59,35,15,4]
	4	[1,0,7,5,35,72,88,106,79,64,39,9,3]
11	6	[2,15,34,73,128,158,188,186,122,67,32]
	5	[2,1,16,19,80,132,164,214,146,121,88,21]
12	6	[1,8,37,80,141,248,329,352,339,248,129]
	5	[1,2,11,27,63,158,259,327,369,326,233,142]
13(1)	7	[4,32,82,158,308,488,626,694,636,408]
	5	[1,1,8,28,62,153,319,504,644,695,627,389]
14(1)	7	[3,16,79,184,335,632,979,1216,1297,994]
	6	[3,4,23,60,153,353,653,971,1215,1373,969]
15(2)	7	[2,10,56,183,388,739,1300,1899,2344,1915]
	6	[2,3,23,45,149,374,746,1315,1896,2399,1980]
16(1)	7	[1,6,44,146,394,885,1573,2565,3763,3312]
	7	[6,10,54,134,357,804,1587,2681,3731,3325]
17(5)	7	[1,4,25,124,369,898,1869,3308,5250,5008]
	7	[3,8,46,130,333,812,1783,3355,5296,5115]
18(3)	8	[4,16,92,316,874,2051,3944,6829,6972]
	7	[1,7,33,115,335,772,1874,3910,6819,7046]
19(4)	8	[2,13,65,245,808,2081,4440,8392,8769]
	7	[1,5,20,97,306,767,1865,4233,8275,8746]
20(3)	8	[2,8,42,202,669,1978,4729,9635,10636]
	8	[5,12,77,255,731,1892,4308,9299,10455]
21(2)	8	[1,5,30,152,562,1743,4665,10566,11994]
	8	[2,11,61,190,669,1829,4359,10006,11329]

Figure 13 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=12, d_{free}=16, (10533,17661) code. (Continued . . .)

22(5)	9	[5,20,108,442,1506,4389,10821,12841]
	8	[1,8,42,158,564,1676,4313,10336,12142]
23	9	[3,14,76,340,1249,3944,10498,13058]
	8	[1,5,33,110,481,1458,4109,10402,12396]
24(1)	9	[3,7,49,274,990,3348,9874,12467]
	8	[1,2,29,77,376,1257,3740,10114,12372]
25	9	[1,6,32,201,785,2792,8799,11527]
	8	[1,1,22,57,295,1020,3331,9427,11985]
26(3)	9	[1,3,23,136,615,2263,7568,10258]
	9	[2,16,40,217,855,2829,8528,11106]
27	9	[1,2,13,93,462,1832,6315,8707]
	9	[1,9,39,154,682,2339,7479,10080]
28	9	[1,1,6,69,334,1395,5270,7185]
	10	[6,34,106,528,1921,6400,8699]
29(1)	10	[2,4,45,223,1069,4258,5884]
	10	[1,28,88,383,1538,5345,7461]
30(1)	10	[1,4,29,160,757,3325,4817]
	11	[18,66,302,1183,4435,6071]
31	10	[1,3,18,109,559,2518,3658]
	11	[7,54,217,943,3588,4937]
32	11	[3,13,72,397,1862,2826]
	11	[5,29,164,750,2770,4131]
33	11	[1,10,53,266,1348,2116]
	11	[1,25,104,549,2251,3110]
34	11	[1,4,38,191,982,1453]
	12	[17,74,398,1661,2635]
35	12	[4,24,137,698,1075]
	12	[13,43,295,1252,1868]
36	12	[2,16,94,505,754]
	12	[6,32,215,910,1423]
37	12	[2,11,59,347,573]
	12	[2,26,128,687,1048]
38	12	[1,7,35,253,368]
	13	[17,92,453,808]
39	12	[1,2,27,171,260]
	13	[4,71,307,533]
40	13	[3,19,104,193]
	13	[1,43,228,333]
41	13	[2,12,68,122]
	13	[1,26,130,292]
42	13	[2,6,46,78]
	13	[1,12,98,134]

Figure 13 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=12, d_{free}=16, (10533,17661) code. (Continued . . .)

43	14 14	[7,34,39] [7,72,85]
44	14 14	[5,18,45] [4,37,86]
45	14 14	[3,10,27] [1,27,33]
46	14 15	[1,11,7] [15,28]
47	15 15	[7,12] [6,18]
48	15 15	[5,4] [5,2]
49	15 15	[3,4] [1,8]
50	15 16	[1,4] [2]
51	15	[1,0] []
52	16	[2] []

Figure 13 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=12, d_{free}=16, (10533,17661) code.

1	2 2	[1] [1]
2	2 3	[1,0,1] [2]
3	3 3	[2,0,2] [1,2,1]
4	4 4	[4,2,0,2] [3,3,1,1]
5	4 4	[2,5,4,2,2,1] [2,3,6,4,0,1]
6	4 5	[1,5,6,10,5,1,4] [6,6,8,8,2,2]
7	5 5	[5,7,13,19,7,5,7,1] [3,9,13,15,13,7,3,1]
8	5 5	[2,10,15,25,31,17,13,11,3,1] [3,4,16,32,26,20,16,8,3]

Figure 14 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=13, d_{free}=16, (21675,27123) code. (Continued . . .)

9	5	[1,6,22,30,44,58,38,26,19,8,4]
	5	[2,4,13,36,52,52,42,28,18,8,1]
10	5	[1,2,10,42,55,92,104,76,55,34,20,10]
	5	[1,3,14,34,62,98,104,80,57,35,18,6]
11	5	[1,2,10,44,80,120,177,184,153,114,68,40]
	5	[1,2,9,35,72,123,186,198,153,112,77,36]
12	6	[4,6,29,92,169,249,316,349,310,224,126]
	6	[2,9,26,75,155,246,345,374,304,229,134]
13	6	[2,6,27,71,191,335,473,613,677,593,374]
	6	[1,9,18,61,183,321,476,653,703,611,385]
14	6	[1,5,23,56,188,414,669,965,1184,1278,943]
	6	[1,5,18,53,158,381,658,945,1240,1355,951]
15	6	[1,1,23,46,165,427,829,1382,1867,2304,1897]
	6	[1,2,16,49,133,382,793,1306,1907,2394,1962]
16	6	[1,0,17,39,146,398,931,1726,2717,3769,3166]
	7	[2,10,45,128,336,845,1651,2637,3755,3378]
17	6	[1,0,14,24,130,362,944,1972,3562,5529,5017]
	7	[1,7,34,112,321,822,1834,3410,5316,5083]
18	6	[1,0,4,38,85,342,857,2151,4188,7286,7427]
	7	[1,3,23,105,281,764,1942,3949,6918,7099]
19	7	[2,1,27,70,291,804,2115,4681,8847,9444]
	7	[1,1,16,81,249,713,1891,4299,8345,8930]
20(2)	8	[5,12,66,229,716,2018,4895,10164,11078]
	8	[2,10,59,207,633,1826,4410,9333,10538]
21	8	[2,11,50,188,603,1856,4864,10894,12671]
	8	[1,7,44,160,546,1660,4365,10035,11408]
22	8	[1,8,37,143,534,1599,4578,11337,13206]
	8	[1,5,29,124,447,1480,4112,10163,12287]
23	8	[1,2,30,116,432,1382,4169,11069,13590]
	9	[6,16,92,375,1228,3776,9946,12185]
24	9	[2,23,76,356,1176,3692,10406,13121]
	9	[4,12,62,300,1031,3281,9371,11863]
25(1)	9	[2,8,77,242,1014,3144,9518,12280]
	9	[3,7,50,217,832,2830,8505,10986]
26	9	[1,7,43,215,747,2798,8344,11066]
	9	[1,7,32,167,664,2317,7524,9945]
27(1)	9	[1,4,30,155,613,2219,7327,9856]
	9	[1,5,18,125,516,1925,6410,8619]
28	10	[4,15,129,439,1807,6260,8350]
	9	[1,4,8,88,406,1549,5340,7395]
29	10	[2,7,96,341,1422,5095,7256]
	10	[4,10,45,309,1225,4357,6220]

Figure 14 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=13, d_{free}=16, (21675,27123) code. (Continued . . .)

30	10	[1,7,55,255,1147,4073,5855]
	10	[2,11,31,206,934,3572,4971]
31	10	[1,3,37,194,865,3171,4863]
	11	[11,28,119,707,2856,3983]
32	11	[5,16,156,596,2639,3504]
	11	[3,28,100,466,2215,3202]
33	11	[1,17,94,477,1919,3040]
	12	[20,81,345,1606,2477]
34	11	[1,10,61,329,1529,2111]
	12	[9,64,248,1231,1731]
35	11	[1,5,39,231,1125,1700]
	12	[5,38,198,897,1345]
36	11	[1,2,35,138,825,1238]
	12	[2,24,140,658,1012]
37	11	[1,0,21,113,540,929]
	12	[1,16,92,472,747]
38	11	[1,0,13,74,407,574]
	13	[12,53,350,509]
39	12	[2,2,58,278,450]
	13	[8,41,222,385]
40	13	[6,23,210,303]
	13	[4,30,155,240]
41	13	[3,20,124,228]
	13	[2,18,113,166]
42	13	[1,14,80,140]
	13	[1,15,71,119]
43	14	[8,56,86]
	14	[9,54,73]
44	14	[3,33,69]
	14	[2,39,60]
45	14	[1,21,33]
	14	[1,20,43]
46	15	[11,24]
	14	[1,10,21]
47	15	[5,12]
	14	[1,7,7]
48	15	[3,4]
	14	[1,4,7]
49	15	[1,4]
	15	[3,6]

Figure 14 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=13, d_{free}=16, (21675,27123) code. (Continued . . .)

50	16 15	[2] [2,2]
51	 16	[] [4]

Figure 14 Forward and reverse column weight distribution for the maximum free distance R=1/2, v=13, d_{free}=16, (21675,27123) code.

Appendix B Maximum Free Distance R=1/3 Codes

This appendix contains the forward and reverse column weight distributions for the maximum free distance (MFD) convolutional codes of rate R=1/3 and memory ν=2 to 13.

1	3	[1]
	3	[1]
2	4	[1,1]
	4	[1,1]
3(1)	5	[2,1,0,1]
	5	[2,1,0,1]
4(1)	5	[1,1,2,2]
	5	[1,1,2,2]
5	6	[1,4,1]
	6	[1,4,1]
6	7	[3,3]
	7	[3,3]
7	7	[1,2]
	7	[1,2]
8	8	[1]
	8	[1]

Figure 15 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=2, d_{free}=8, (5,7,7) code.

1	3	[1]
	3	[1]
2	4	[1,1]
	4	[1,1]
3	5	[1,2,1]
	5	[1,2,1]
4(1)	6	[1,4,2,0,1]
	6	[1,4,2,0,1]
5(1)	7	[2,4,5,3]
	7	[2,4,5,3]
6(1)	7	[1,1,6,9]
	7	[1,1,6,9]

Figure 16 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=3, d_{free}=10, (13,15,17) code. (Continued . . .)

7	8	[1,3,6]
	8	[1,3,6]
8	9	[1,4]
	9	[1,4]
9	10	[1]
	10	[1]

Figure 16 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=3, d_{free}=10, (13,15,17) code.

1	3	[1]
	3	[1]
2	4	[1,1]
	4	[1,1]
3	5	[1,2,1]
	5	[1,2,1]
4	6	[2,2,2,2]
	6	[2,2,2,2]
5(1)	7	[3,3,4,4,1,1]
	7	[3,3,4,4,1,1]
6(1)	8	[4,7,4,7,7]
	8	[4,7,4,7,7]
7(2)	9	[7,9,8,12]
	9	[7,9,8,12]
8(1)	9	[2,6,14,17]
	9	[2,6,14,17]
9	10	[3,11,15]
	10	[3,11,15]
10	11	[4,13]
	11	[4,13]

Figure 17 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=4, d_{free}=12, (25,33,37) code. (Continued . . .)

11	11	[1,3]
	11	[1,3]
12	12	[1]
	12	[1]

Figure 17 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=4, d_{free}=12, (25,33,37) code.

16		[]
	12	[1,1]
17		[]
	13	[1]

Figure 18 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=5, d_{free}=13, (47,53,75) code.

1	3	[1]
	3	[1]
2	4	[1,1]
	4	[1,1]
3	5	[1,2,1]
	5	[1,2,1]
4	6	[1,4,2,0,1]
	5	[1,0,2,4,1]
5	7	[2,4,5,4,0,0,1]
	5	[1,0,0,4,5,4,2]
6(1)	8	[3,7,7,7,5,1]
	6	[1,1,0,6,9,5,6,4]
7	8	[1,3,10,14,12,11]
	7	[1,2,2,7,14,13,9]
8	9	[1,7,13,22,22]
	7	[1,0,2,8,8,18,26]
9	9	[1,2,8,19,31]
	8	[1,1,3,11,17,21]
10	10	[2,4,10,23]
	8	[1,0,1,9,12,22]
11	11	[2,11,9]
	9	[1,1,2,14,15]
12	11	[1,3,10]
	9	[1,0,1,7,13]
13	11	[1,1,2]
	10	[1,1,3,6]
14	12	[1,2]
	11	[1,2,4]
15	13	[1]
	11	[1,0,2]

Figure 18 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=5, d_{free}=13, (47,53,75) code. (Continued . . .)

1	3	[1]
	3	[1]
2	4	[1,1]
	4	[1,1]
3	5	[1,2,1]
	5	[2,1,0,1]
4	6	[2,2,2,2]
	6	[2,3,1,1,1]
5	6	[1,1,4,4,3,3]
	7	[3,4,3,4,1,0,1]
6	6	[1,0,3,4,7,8,5,4]
	7	[1,3,6,7,6,5,2,1,1]
7(1)	7	[1,3,1,7,11,17,11,5,8]
	8	[2,4,8,14,12,10,8,2]
8	8	[1,4,4,15,11,27,29,10]
	8	[1,1,5,18,22,18,22,19]
9(1)	8	[1,1,3,10,24,25,32,50]
	9	[2,3,7,22,37,44,34]
10	9	[1,3,5,14,36,48,46]
	9	[1,2,3,18,32,48,72]
11	10	[1,5,13,18,55,68]
	10	[1,4,6,26,59,56]
12	10	[1,0,10,16,39,61]
	11	[1,7,17,33,66]
13	11	[1,1,19,22,41]
	12	[3,10,23,43]
14(1)	12	[2,5,20,33]
	12	[1,4,15,27]
15	13	[2,10,22]
	13	[1,8,16]

Figure 19 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=6, d_{free}=15, (133,145,175) code. (Continued . . .)

16	14	[3,11]
	14	[2,8]
17	15	[3]
	15	[2]

Figure 19 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=6, d_{free}=15, (133,145,175) code.

16	14	[3,14,20]
	14	[5,9,18]
17	15	[6,14]
	14	[1,7,10]
18	16	[6]
	15	[2,7]
19		[]
	16	[2]

Figure 20 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=7, d_{free}=16, (225,331,367) code.

1	3	[1]
	3	[1]
2	4	[1,1]
	4	[1,1]
3	5	[1,2,1]
	5	[1,2,1]
4	6	[2,2,2,2]
	6	[2,2,2,2]
5	7	[3,3,4,4,1,1]
	7	[3,3,4,4,1,1]
6	8	[4,7,4,7,8,1,0,1]
	7	[2,1,4,11,6,3,4,1]
7	8	[1,5,9,10,13,14,7,2,2]
	8	[2,5,5,12,17,10,7,4,1]
8(1)	9	[1,9,14,17,23,23,21,11]
	9	[3,8,9,18,30,22,14,14]
9	10	[5,9,20,32,40,48,36]
	10	[6,11,17,29,38,52,40]
10	11	[6,18,36,44,68,79]
	10	[1,11,12,25,60,60,71]
11	11	[1,12,25,46,88,97]
	11	[1,13,31,47,73,93]
12	12	[4,14,44,83,97]
	11	[1,3,17,47,79,98]
13	12	[2,8,20,61,106]
	12	[4,5,25,69,100]
14	13	[5,14,33,62]
	13	[5,11,46,72]
15	13	[2,5,24,38]
	13	[2,7,17,48]

Figure 20 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=7, d_{free}=16, (225,331,367) code. (Continued . . .)

1	3	[1]
	3	[1]
2	4	[1,1]
	4	[1,1]
3	5	[1,2,1]
	5	[1,2,1]
4	5	[1,0,2,4,1]
	6	[2,2,2,2]
5	6	[1,2,2,4,5,2]
	6	[1,1,4,4,3,3]
6	7	[1,4,5,4,7,8,3]
	7	[1,4,3,8,7,4,5]
7	8	[2,4,9,12,9,12,11,4,1]
	7	[1,0,6,6,10,16,14,6,1,4]
8	9	[3,8,13,16,22,24,18,16,7]
	8	[1,3,4,14,19,19,29,21,8,6,3]
9(1)	9	[1,5,10,19,31,38,44,42,31,21]
	9	[1,5,12,13,31,46,40,46,31,13]
10(1)	9	[1,2,7,14,27,53,75,81,71,65]
	9	[1,08,21,23,45,74,82,87,69]
11(1)	10	[3,2,8,28,47,81,117,146,141]
	10	[1,4,10,26,49,79,109,139,158]
12(2)	11	[5,4,10,44,84,128,197,218]
	10	[1,1,4,18,43,76,134,191,197]
13	11	[1,7,8,20,62,126,231,267]
	11	[2,4,4,31,62,123,232,257]

Figure 21 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=8, d_{free}=18, (557,663,711) code. (Continued . . .)

14	11	[1,1,8,19,32,100,214,271]
	12	[3,7,14,38,108,207,272]
15	12	[1,3,10,33,65,53,117,170]
	12	[1,6,5,32,66,154,259]
16	13	[3,5,15,53,117,170]
	13	[2,9,16,48,110,167]
17	13	[2,2,6,28,92,131]
	14	[7,8,30,85,118]
18	14	[3,3,14,51,90]
	15	[9,19,35,56]
19	15	[4,8,23,53]
	15	[3,9,35,56]
20	15	[1,7,13,22]
	15	[1,4,17,35]
21	16	[2,10,16]
	16	[2,8,16]
22	16	[1,6,6]
	17	[4,8]
23	17	[1,7]
	18	[4]
24	18	[1]
		[]

Figure 21 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=8, d_{free}=18, (557,663,711) code.

1	3	[1]
	3	[1]
2	4	[1,1]
	4	[1,1]
3	5	[1,2,1]
	5	[1,2,1]
4	5	[1,0,2,4,1]
	6	[2,2,2,2]
5	5	[1,0,0,4,5,4,2]
	7	[3,3,4,4,1,1]
6	6	[1,1,1,4,8,9,5,2,1]
	7	[1,3,5,7,7,5,3,1]

Figure 22 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=9, d_{free}=20, (1117,1365,1633) code. (Continued . . .)

7	6	[1,0,1,4,6,12,14,12,9,4,1]
	8	[3,3,7,13,11,13,9,3,2]
8	7	[1,2,0,5,12,18,26,24,19,12,6,3]
	8	[2,1,7,12,16,26,22,20,14,5,3]
9	8	[1,3,3,8,16,31,42,44,45,29,19,12,2]
	8	[1,1,5,8,21,28,36,50,37,35,23,6,5]
10(1)	8	[1,1,2,7,16,27,44,71,82,83,78,49,27]
	9	[1,3,6,14,31,51,66,80,83,69,54,32]
11(1)	9	[1,3,6,7,25,50,66,115,151,156,162,116]
	9	[1,0,5,9,25,50,81,115,143,156,143,116]
12	10	[2,4,8,15,43,75,111,205,259,269,284]
	9	[1,0,1,9,16,40,76,125,196,260,308,249]
13(2)	11	[4,7,10,27,66,124,206,319,438,443]
	9	[1,0,1,3,14,30,51,130,222,298,457,498]
14(1)	11	[1,6,8,19,52,101,195,353,545,601]
	10	[1,1,1,5,27,45,89,204,344,531,643]
15(1)	12	[4,4,18,40,64,178,330,556,735]
	11	[1,3,2,9,41,72,166,313,551,724]
16	13	[5,10,26,69,127,270,516,719]
	12	[2,4,5,23,47,139,263,495,714]
17(1)	14	[8,18,47,102,221,448,617]
	13	[5,3,13,37,86,205,441,610]
18	14	[2,9,33,78,171,358,532]
	13	[1,4,9,25,56,144,348,505]
19	14	[2,2,12,51,148,271,404]
	13	[1,1,3,17,48,93,238,392]
20(1)	14	[1,1,7,25,81,218,332]
	14	[1,2,7,27,76,169,258]
21	15	[1,4,14,44,131,232]
	15	[2,3,16,40,128,191]
22	16	[2,6,25,76,138]
	16	[3,5,26,77,130]
23	17	[3,14,41,77]
	16	[2,1,12,41,83]
24	17	[1,8,18,42]
	17	[2,7,14,44]
25	18	[3,9,22]
	18	[6,8,14]
26	18	[1,5,8]
	18	[1,8,10]
27	18	[1,1,4]
	18	[1,2,6]

Figure 22 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=9, d_{free}=20, (1117,1365,1633) code. (Continued . . .)

28	19	[1,2]
	19	[1,3]
29	20	[1]
	19	[1]
30		[]
	19	[1]

Figure 22 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=9, d_{free}=20, (1117,1365,1633) code. (Continued . . .)

31		[]
	19	[1]
32		[]
	20	[1]

Figure 22 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=9, d_{free}=20, (1117,1365,1633) code.

1	3	[1]
	3	[1]
2	4	[1,1]
	4	[1,1]
3	5	[1,2,1]
	5	[1,2,1]
4	6	[2,2,2,2]
	5	[1,0,2,4,1]
5	7	[3,3,4,4,1,1]
	5	[1,0,0,4,5,4,2]
6	8	[3,8,7,4,5,4,1]
	6	[1,1,1,4,8,9,5,2,1]
7	9	[6,10,11,12,9,10,5,0,1]
	7	[2,1,1,8,12,14,14,8,2,1,1]
8	9	[2,6,14,23,21,19,21,13,5,3,1]
	7	[1,1,2,5,9,20,26,24,21,11,4,3,1]
9	9	[1,3,7,22,39,38,38,44,31,15,11,6,1]
	8	[1,3,3,7,17,30,43,46,43,31,17,11,3,0,1]
10(1)	10	[1,7,12,30,62,68,76,88,65,43,32,18,8]
	9	[2,5,5,10,27,50,72,85,84,69,49,32,15,4]
11(1)	10	[1,3,6,22,49,88,132,147,147,139,118,84,42]
	10	[3,7,10,22,41,72,121,155,162,151,116,76,49]
12(1)	11	[1,4,17,32,72,156,200,247,319,289,233,186]
	10	[2,3,7,22,34,69,131,178,260,331,295,242,191]
13(1)	11	[1,1,10,20,52,132,222,348,459,534,592,470]
	11	[2,8,13,26,65,124,194,301,456,570,588,485]
14(3)	12	[1,5,10,39,99,182,364,594,779,981,968]
	11	[1,3,11,24,45,97,201,340,510,757,995,977]
15(2)	12	[1,2,4,23,66,146,312,594,956,1338,1485]
	12	[1,7,19,39,72,152,334,577,860,1269,1452]
16(2)	13	[2,3,9,39,108,246,495,938,1597,1885]
	13	[4,9,28,69,124,262,522,923,1487,1758]

Figure 23 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=10, d_{free}=22, (2353,2671,3175) code. (Continued . . .)

17(1)	14	[3,9,15,65,184,379,811,154,2029]
	13	[2,6,15,42,106,224,433,853,1546,1909]
18	14	[1,4,13,34,109,299,633,1313,1872]
	13	[1,4,8,27,76,165,364,724,1396,1940]
19(1)	15	[3,8,18,61,197,478,1030,1535]
	14	[1,7,20,40,125,284,560,1243,1696]
20(1)	15	[1,4,12,38,118,311,766,1186]
	14	[1,1,9,32,81,206,471,969,1385]
21(1)	15	[1,1,8,20,68,207,518,825]
	14	[1,1,1,17,57,136,331,799,1114]
22	16	[1,7,8,35,135,335,545]
	15	[1,2,8,29,87,236,570,864]
23	16	[1,2,8,20,58,230,363]
	16	[2,4,15,147,393,618]
24	17	[1,5,12,35,134,208]
	16	[1,2,6,35,91,242,419]
25	17	[1,1,8,26,70,121]
	16	[1,1,2,15,58,162,248]
26	18	[1,4,21,31,71]
	17	[1,2,7,29,104,157]
27	19	[2,12,23,38]
	18	[1,6,10,61,100]
28	20	[4,9,26]
	19	[4,7,28,53]
29	20	[2,5,18]
	20	[6,18,24]
30	21	[4,5]
	20	[2,9,17]
31	21	[1,3]
	20	[1,6,5]
32	22	[1]
	21	[4,4]
33		[]
	21	[1,3]
34		[]
	22	[1]

Figure 23 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=10, d_{free}=22, (2353,2671,3175) code.

1	3	[1]
	3	[1]
2	4	[1,1]
	4	[1,1]
3	5	[1,2,1]
	5	[1,2,1]
4	6	[2,2,2,2]
	6	[1,4,2,0,1]
5	7	[3,3,4,4,1,1]
	7	[2,5,4,2,2,1]
6	7	[1,2,5,10,7,2,3,2]
	7	[1,3,4,8,9,3,2,2]
7	8	[2,3,8,13,14,13,4,3,4]
	8	[1,4,10,13,10,11,10,3,1,1]
8	9	[2,8,13,16,24,28,18,8,6,4,1]
	9	[2,6,15,21,21,21,19,15,5,1,2]
9	9	[1,4,9,20,29,42,48,42,33,10,7,10,1]
	9	[1,3,7,23,37,38,42,38,31,23,7,3,3]
10	9	[1,0,7,15,29,51,73,82,79,82,45,15,19,11,3]
	10	[3,4,11,34,57,74,75,76,77,48,25,18,7,2,1]
11	9	[1,0,0,11,27,45,82,122,147,162,148,119,77,33,26,20]
	10	[1,2,8,22,50,89,123,150,149,137,126,82,40,27,14]
12(1)	10	[1,1,4,13,39,80,130,203,263,296,304,259,185,124,67]
	11	[2,4,10,41,82,128,208,276,292,276,250,206,130,69]
13(1)	11	[1,3,5,30,59,111,226,346,447,527,602,564,413,291]
	12	[3,6,24,58,126,229,327,462,566,560,509,438,319]
14(2)	11	[1,0,5,13,41,107,176,350,580,783,983,1074,1106,903]
	12	[1,5,11,33,100,197,375,569,760,1010,1080,1054,870]
15(4)	12	[1,2,8,23,73,152,307,567,948,1364,1692,2028,1922]
	13	[2,7,23,55,155,326,600,938,1327,1773,2009,1841]
16(3)	13	[1,6,15,40,101,275,486,918,1585,2259,3085,3136]
	13	[1,4,10,31,107,247,523,992,1533,2268,3103,3167]
17(4)	14	[1,9,30,72,149,445,843,1488,2559,3884,4416]
	14	[2,7,19,54,173,410,827,1595,2617,3844,4412]
18(2)	14	[1,2,14,50,117,269,689,1392,2477,4233,5193]
	14	[1,4,8,32,111,271,658,1362,2563,4371,5226]
19(3)	15	[2,8,19,69,214,486,1078,2253,4114,5378]
	15	[3,4,16,57,183,471,1040,2253,4192,5503]
20(1)	16	[4,13,29,138,345,799,1763,3639,5097]
	16	[3,11,26,108,309,767,1693,3660,5136]
21	16	[2,5,19,71,215,561,1335,2868,4305]
	17	[6,18,52,181,504,1270,2866,4171]

Figure 24 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=11, d_{free}=24, (4767,5723,6265) code. (Continued . . .)

22	16	[1,3,7,33,123,369,929,2204,3288]
	17	[2,8,30,97,301,853,2117,3206]
23	17	[2,5,14,61,220,601,1551,2451]
	17	[1,3,15,61,154,513,1457,2291]
24	17	[1,3,7,35,99,373,1022,1663]
	18	[1,6,28,97,303,876,1507]
25	18	[2,6,15,56,192,604,1094]
	19	[3,15,48,158,540,915]
26	19	[4,8,28,111,359,585]
	20	[8,24,79,314,531]
27	20	[9,18,42,206,364]
	20	[3,10,40,170,297]
28	20	[2,10,33,104,184]
	21	[3,25,75,161]
29	21	[5,15,66,102]
	21	[1,8,42,74]
30	21	[2,5,29,68]
	21	[1,2,16,39]
31	21	[1,1,14,27]
	22	[1,6,15]
32	22	[2,4,11]
	23	[2,6]
33	23	[2,6]
	23	[1,1]
34	23	[1,1]
	23	[1]
35	24	[1]
	24	[1]

Figure 24 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=11, d_{free}=24, (4767,5723,6265) code.

1	3	[1]
	3	[1]
2	4	[1,1]
	4	[1,1]
3	5	[2,1,0,1]
	5	[1,2,1]
4	5	[1,2,1,1,2,1]
	6	[2,2,2,2]

Figure 25 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=12, d_{free}=24, (10533,10675,17661) code. (Continued . . .)

5	6	[2,2,3,4,0,2,3]
	7	[3,3,4,4,1,1]
6	7	[2,4,5,7,4,2,5,3]
	7	[1,2,6,8,6,6,2,0,1]
7	7	[1,2,5,8,13,12,5,8,6,2,2]
	8	[1,5,8,12,14,10,8,4,1,1]
8	8	[1,5,8,12,20,20,18,18,7,6,2]
	8	[1,1,5,15,20,24,24,16,11,7,3,1]
9	9	[2,7,12,21,32,38,40,34,26,19,12,9,4]
	9	[1,4,10,17,29,47,50,36,25,20,12,3,1,1]
10	10	[3,12,17,36,58,60,76,72,55,52,33,20,12,4,2]
	9	[1,0,6,19,27,46,74,90,80,64,54,27,11,10,2]
11	11	[5,15,35,63,77,115,153,125,119,125,77,49,39,17]
	10	[1,2,11,24,46,85,112,148,175,145,107,80,48,23,10]
12	11	[1,7,22,57,103,141,194,246,260,258,247,197,123,82]
	11	[2,4,15,44,77,124,196,256,308,323,247,177,133,72]
13(1)	12	[2,16,36,77,164,249,332,434,506,517,474,416,315]
	11	[1,2,10,24,62,131,210,312,441,584,598,514,459,296]
14(1)	13	[9,24,51,123,259,423,573,766,932,981,973,797]
	12	[2,2,16,49,89,192,374,554,738,981,1127,1098,891]
15(2)	13	[2,12,37,91,203,405,684,1006,1352,1637,1850,1739]
	13	[3,10,23,64,153,332,592,919,1314,1686,2039,1939]
16(1)	14	[4,21,65,149,306,663,1178,1658,2287,3017,2974]
	13	[1,4,17,44,99,258,526,943,1575,2221,2960,3182]
17(3)	14	[2,9,27,100,263,531,1043,1853,2856,4029,4407]
	13	[1,0,9,24,73,177,409,860,1559,2585,3773,4287]
18(1)	15	[5,11,51,176,414,862,1707,3058,4748,5628]
	13	[1,0,1,13,52,111,286,698,1362,2571,4299,5117]
19	15	[2,5,26,94,271,679,1416,2773,5025,6281]
	13	[1,0,0,3,23,87,202,456,1100,2317,4174,5460]
20(1)	16	[3,17,41,161,453,1053,2356,4609,6178]
	14	[1,1,0,8,42,134,343,785,1765,3739,5179]
21	17	[7,28,87,262,724,1757,3844,5493]
	15	[1,2,1,21,62,224,589,1283,2942,4346]
22	17	[3,14,43,144,465,1210,2860,4391]
	16	[2,2,9,38,104,356,957,2250,3283]
23	17	[2,4,22,80,251,774,2012,3179]
	17	[4,4,19,64,191,577,1569,2536]
24	18	[4,8,42,150,440,1286,2149]
	17	[1,5,12,27,107,355,1009,1625]
25	19	[7,22,71,254,761,1350]
	17	[1,2,6,19,57,193,612,1046]

Figure 25 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=12, d_{free}=24, (10533,10675,17661) code. (Continued . . .)

26	19	[3,11,36,144,429,774]
	18	[2,3,8,36,107,349,618]
27	20	[7,21,56,263,446]
	19	[2,7,17,65,192,347]
28	20	[2,9,39,125,239]
	19	[1,2,11,32,108,208]
29	20	[2,4,17,60,130]
	20	[3,4,16,63,106]
30	21	[3,9,28,62]
	20	[1,4,8,25,67]
31	21	[2,1,15,34]
	21	[3,5,12,29]
32	21	[1,1,7,12]
	21	[1,3,8,15]
33	22	[1,4,6]
	22	[1,7,8]
34	23	[2,4]
	23	[3,6]
35	24	[2]
	23	[2,1]
36		[]
	24	[2]

Figure 25 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=12, d_{free}=24, (10533,10675,17661) code.

1	3	[1]
	3	[1]
2	4	[1,1]
	4	[1,1]
3	4	[1,0,1,2]
	5	[1,2,1]
4	5	[1,1,1,3,2]
	6	[2,2,2,2]
5	6	[1,2,4,2,3,4]
	6	[1,1,4,4,3,3]
6	7	[1,5,4,6,5,5,6]
	7	[2,1,6,7,6,7,2,1]
7	8	[4,3,8,11,12,9,8,9]
	7	[1,1,4,8,10,14,12,8,5,1]

Figure 26 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=13, d_{free}=26, (21645,35661,37133) code. (Continued . . .)

8	8	[1,3,11,7,21,21,17,14,12]
	8	[1,3,6,9,22,26,16,22,17,3,2,1]
9	9	[3,2,15,17,36,34,36,40,33,28,5,7]
	9	[3,4,6,18,36,40,40,44,31,20,10,2,2]
10	10	[4,6,20,33,49,72,68,70,74,58,32,19,9]
	10	[4,7,14,28,46,76,85,76,68,51,36,16,2,2,1]
11	10	[2,2,16,23,62,82,104,147,134,150,120,85,58,22,16,1]
	11	[5,12,26,47,74,118,153,157,137,120,92,49,24,6,1,3]
12	11	[2,7,21,44,89,143,189,244,269,277,263,204,147,85,39,20]
	11	[1,8,17,44,78,117,199,265,297,292,244,206,148,77,35,12]
13	12	[6,8,30,77,155,210,336,435,493,556,486,483,365,210,137]
	12	[4,13,25,66,121,215,338,432,545,569,524,468,331,221,132]
14(1)	12	[1,5,21,45,141,216,372,541,777,952,960,1065,935,804,581]
	12	[1,8,22,34,99,222,339,545,794,945,1066,1093,950,773,553]
15(1)	13	[4,3,37,77,234,333,612,953,1312,1689,1832,2043,1936,1557]
	13	[4,11,28,81,162,307,583,941,1316,1706,2008,2066,1976,1586]
16(1)	13	[1,3,14,54,153,298,603,1043,1578,2227,2937,3557,3775,3418]
	13	[1,5,16,52,128,272,507,937,1580,2264,2990,3576,3954,3635]
17	13	[1,0,7,27,89,227,525,961,1693,2671,3862,5200,6258,6272]
	14	[3,9,24,83,215,445,846,1550,2574,3819,5263,6550,6341]
18(3)	14	[1,1,15,45,150,376,828,1595,2755,4528,6582,8962,9685]
	14	[1,3,15,49,133,342,731,1420,2550,4230,6464,9151,9846]
19(2)	15	[1,4,21,100,241,594,1341,2604,4596,7495,11250,12841]
	15	[3,8,19,89,233,520,1199,2370,4205,7050,10975,12739]
20(1)	16	[3,10,32,177,396,960,2176,4287,7665,12395,15213]
	15	[1,3,14,55,123,,370,912,1901,3889,7035,11722,14562]
21	17	[4,17,81,277,642,1602,3537,7032,12562,16112]
	16	[3,5,25,92,229,589,1486,3167,6344,11606,15006]
22(1)	18	[9,40,128,455,1097,2662,5710,11515,15624]
	16	[1,3,10,42,157,387,1031,2411,5140,10441,14313]
23	18	[1,16,63,261,705,1860,4404,9414,13543]
	16	[1,1,7,19,80,235,688,1707,3947,8569,12278]
24(1)	19	[3,37,103,433,1220,3120,7228,10749]
	17	[1,6,8,38,131,427,1148,2849,6461,9851]
25(1)	19	[1,11,64,195,724,2052,5126,8115]
	17	[1,2,5,20,73,225,741,1842,4790,7342]
26	20	[5,28,94,385,1187,3450,5595]
	18	[2,5,7,38,125,412,1213,3255,5090]
27	20	[2,9,54,185,661,2043,3593]
	18	[2,0,9,22,51,256,687,2051,3498]
28	20	[1,3,18,108,325,1196,2064]
	19	[2,3,15,37,114,418,1227,2110]

Figure 26 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=13, d_{free}=26, (21645,35661,37133) code. (Continued . . .)

29	20	[1,0,7,49,173,622,1172]
	19	[1,1,8,21,70,230,688,1277]
30	21	[1,3,21,78,327,612]
	20	[1,6,7,40,142,392,696]
31	21	[1,0,8,39,157,309]
	21	[2,8,17,83,222,408]
32	22	[1,2,13,84,147]
	22	[4,11,42,126,237]
33	23	[1,6,33,73]
	23	[7,23,73,126]
34	24	[2,14,30]
	23	[4,6,45,75]
35	25	[6,12]
	24	[6,18,39]
36	26	[6]
	24	[1,12,16]
37		[]
	25	[2,12]
38		[]
	26	[2]

Figure 26 Forward and reverse column weight distribution for the maximum free distance R=1/3, v=13, d_{free}=26, (21645,35661,37133) code.

Appendix C Maximum Free Distance R=1/4 Codes

This appendix contains the forward and reverse column weight distributions for the maximum free distance (MFD) convolutional codes of rate R=1/4 and memory ν=2 to 13.

1	4	[1]
	4	[1]
2	5	[1,0,1]
	5	[1,0,1]
3	6	[1,1,1]
	6	[1,1,1]
4(1)	6	[1,0,1,1,2]
	6	[1,0,1,1,2]
5	7	[1,0,3]
	7	[1,0,3]
6	8	[1,2,2]
	8	[1,2,2]
7	8	[1,0,2]
	8	[1,0,2]
8	9	[1]
	9	[1]
9	10	[1]
	10	[1]

Figure 27 Forward and reverse column weight distribution for the maximum free distance R=1/4, v=2, d_{free}=10, (5,7,7,7) code.

1	4	[1]
	4	[1]
2	5	[1,0,1]
	6	[2]
3	6	[1,0,1,2]
	7	[2,0,2]
4(1)	7	[1,0,2,3,0,1,1]
	8	[1,3,2,0,1,1]
5	9	[2,3,0,1,1]
	9	[1,3,4,2,1]

Figure 28 Forward and reverse column weight distribution for the maximum free distance R=1/4, v=3, d_{free}=13, (13,15,15,17) code. (Continued . . .)

6(1)	9	[1,1,2,4,7]
	9	[1,0,1,8,5]
7	10	[1,0,6,3]
	11	[2,2,5]
8	11	[1,1,4]
	12	[3]
9	12	[1,1]
	13	[1]

Figure 28 Forward and reverse column weight distribution for the maximum free distance R=1/4, v=3, d_{free}=13, (13,15,15,17) code.

1	4	[1]
	4	[1]
2	6	[2]
	5	[1,0,1]
3	7	[2,0,2]
	7	[2,1,0,1]
4	8	[1,2,2,2,1]
	8	[1,3,1,1,2]
5(1)	9	[1,0,6,5,1,2,0,1]
	9	[1,2,3,5,3,0,1,1]
6(1)	10	[1,0,5,9,5,6,3]
	11	[2,7,6,4,6,3]
7(2)	12	[4,2,7,14,11]
	12	[3,5,8,13,8]
8	13	[2,7,9,8]
	13	[3,5,10,15]
9	14	[1,6,12]
	15	[10,10]

Figure 29 Forward and reverse column weight distribution for the maximum free distance R=1/4, v=4, d_{free}=16, (25,27,33,37) code. (Continued . . .)

10	15	[1,2]
	16	[5]
11	16	[1]
		[]

Figure 29 Forward and reverse column weight distribution for the maximum free distance R=1/4, v=4, d_{free}=16, (25,27,33,37) code.

1	4	[1]
	4	[1]
2	5	[1,0,1]
	6	[2]
3	7	[2,1,0,1]
	8	[4]
4	8	[1,3,1,1,2]
	9	[4,0,4]
5	9	[1,2,4,4,1,2,2]
	9	[1,2,2,4,5,2]
6(1)	9	[1,0,1,5,6,8,5,1,3,2]
	10	[1,2,3,5,8,8,3,1,1]
7(1)	11	[3,0,2,12,11,11,9,6]
	11	[1,1,6,5,12,14,10,9]
8(1)	12	[2,2,5,9,15,25,15]
	12	[1,2,4,9,16,20,22]
9	14	[5,6,11,25,23]
	13	[1,1,8,8,19,32]
10	15	[4,7,14,28]
	14	[1,1,8,6,28]
11	16	[5,6,11]
	16	[5,4,8]
12	17	[2,10]
	17	[1,10]
13		[]
	18	[1]

Figure 30 Forward and reverse column weight distribution for the maximum free distance R=1/4, v=5, d_{free}=18, (53,67,71,75) code.

1	4	[1]
	4	[1]
2	6	[2]
	6	[2]
3	7	[2,0,2]
	7	[2,0,2]
4	7	[1,1,0,2,3,1]
	7	[1,1,0,2,3,1]
5	7	[1,1,0,0,2,5,4,2,1]
	7	[1,1,0,0,2,5,4,2,1]
6	8	[1,1,1,1,4,4,5,5,5,5]
	8	[1,1,1,1,4,4,5,5,5,5]
7(1)	9	[2,0,2,3,6,3,6,13,8,9,8,4]
	9	[2,0,2,3,6,3,6,13,8,9,8,4]
8(1)	10	[1,2,2,6,6,6,15,14,13,20,17]
	10	[1,2,2,6,6,6,15,14,13,20,17]
9(1)	11	[2,1,5,5,7,22,12,17,33,26]
	11	[2,1,5,5,7,22,12,17,33,26]
10(2)	12	[2,2,4,8,20,22,18,36,38]
	12	[2,2,4,8,20,22,18,36,38]
11(2)	12	[1,1,2,3,19,20,27,50,36]
	12	[1,1,2,3,19,20,27,50,36]
12(1)	13	[2,0,3,9,16,24,48,60]
	13	[2,0,3,9,16,24,48,60]
13	13	[1,1,1,7,7,15,43,48]
	13	[1,1,1,7,7,15,43,48]
14	14	[1,0,5,7,6,31,38]
	14	[1,0,5,7,6,31,38]
15(1)	16	[4,3,5,24,21]
	16	[4,3,5,24,21]
16(1)	16	[1,1,7,8,21]
	16	[1,1,7,8,21]
17	18	[2,11,5]
	18	[2,11,5]
18	19	[7,6]
	19	[7,6]
19	19	[3,3]
	19	[3,3]
20	19	[1,2]
	19	[1,2]
21	20	[1]
	20	[1]

Figure 31 Forward and reverse column weight distribution for the maximum free distance R=1/4, v=6, d_{free}=20, (135,135,147,163) code.

1	4	[1]
	4	[1]
2	6	[2]
	6	[2]
3	8	[4]
	7	[2,0,2]
4	8	[1,0,6,0,1]
	8	[1,3,2,0,1,1]
5	10	[4,0,8,0,4]
	9	[2,2,2,5,2,0,2,1]
6	11	[4,0,12,0,12,0,4]
	10	[1,3,4,5,9,2,2,5,0,1]
7	11	[1,1,5,8,10,14,10,8,5,1,1]
	11	[1,3,6,5,13,12,9,6,2,5,1,1]
8	12	[1,0,6,11,15,22,20,20,15,10,6]
	12	[1,1,8,13,14,19,19,19,16,8,1]
9(1)	13	[1,0,8,7,31,23,35,45,29,39]
	14	[2,10,11,31,26,24,47,30,34]
10	15	[5,5,6,29,50,57,67,71]
	15	[1,9,17,36,53,42,57,73]
11	16	[2,12,8,29,57,95,104]
	17	[8,25,39,70,85,84]
12	16	[1,1,4,27,31,64,108]
	17	[1,9,21,49,88,123]
13	18	[4,5,21,49,64]
	18	[2,13,17,52,103]
14	18	[1,2,8,20,48]
	19	[4,8,20,49]
15	20	[5,8,18]
	20	[4,7,18]
16	21	[4,7]
	21	[5,4]
17	21	[1]
	22	[3]
18	22	[1]
		[]

Figure 32 Forward and reverse column weight distribution for the maximum free distance R=1/4, v=7, d_{free}=22, (235,275,313,357) code.

1	4	[1]
	4	[1]
2	6	[2]
	6	[2]
3	7	[2,0,2]
	6	[1,0,2,0,1]
4	8	[1,2,2,2,1]
	8	[2,0,4,0,2]
5	9	[1,0,6,5,1,2,0,1]
	9	[2,0,6,0,6,0,2]
6	9	[1,0,1,3,7,10,4,3,2,0,1]
	10	[2,0,4,10,4,4,4,2,2]
7	11	[2,1,3,8,12,14,10,8,2,1,3]
	10	[1,0,3,1,11,12,13,8,4,8,0,3]
8	13	[5,4,4,20,26,18,16,18,9,2,4,2]
	11	[1,1,2,5,7,16,26,22,13,13,12,5,3,2]
9(1)	13	[1,3,4,11,22,31,42,38,29,33,24,7]
	13	[2,4,6,9,24,21,49,38,26,34,16,17]
10	15	[4,7,14,24,36,68,80,63,60,62]
	14	[3,0,13,12,29,34,48,94,64,64,52]
11(1)	15	[1,2,6,21,36,44,81,129,137,124]
	14	[1,0,6,8,20,34,56,69,110,151,126]
12	16	[2,2,6,23,38,74,116,151,219]
	15	[1,0,6,12,22,45,74,113,141,199]
13	16	[1,0,5,6,18,51,90,167,210]
	17	[2,4,20,24,52,96,145,214]
14	17	[1,0,4,10,22,56,118,170]
	18	[3,5,13,48,56,120,167]
15	18	[1,0,4,12,26,68,117]
	19	[5,3,21,32,93,131]
16	20	[3,6,8,32,58]
	20	[2,13,15,53,61]
17	21	[1,10,15,23]
	21	[4,6,27,48]
18	22	[2,7,13]
	22	[2,10,21]
19	23	[3,5]
	23	[2,9]
20	24	[1]
	23	[1]

Figure 33 Forward and reverse column weight distribution for the maximum free distance R=1/4, v=8, d_{free}=24, (463,535,733,745) code.

1	4	[1]
	4	[1]
2	6	[2]
	5	[1,0,1]
3	7	[2,0,2]
	6	[1,0,1,2]
4	7	[1,1,0,2,3,1]
	8	[2,2,1,1,1,1]
5	8	[1,0,3,1,3,6,1,1]
	9	[1,2,6,1,1,4,0,1]
6	9	[1,0,4,1,6,7,4,7,1,1]
	10	[2,2,4,6,4,6,4,2,2]
7	10	[1,0,3,5,8,12,4,10,15,4,1,1]
	10	[1,0,3,7,5,11,11,7,10,5,2,2]
8	11	[1,1,3,4,10,18,18,16,17,21,11,4,4]
	12	[3,3,5,7,15,25,18,16,13,11,9,1,1,1]
9	13	[2,6,5,11,22,24,36,40,32,32,23,13,8,2]
	12	[1,2,4,4,14,21,26,39,37,36,24,18,20,5,2,3]
10(1)	14	[4,2,6,21,26,42,47,63,73,66,72,39,24,18]
	13	[2,0,5,9,11,28,44,62,63,66,69,53,41,24,18]
11	14	[1,2,5,7,22,41,52,76,99,124,127,137,120,77]
	15	[5,2,10,17,36,60,82,123,119,120,123,111,84]
12(1)	16	[3,5,15,19,39,92,118,148,201,234,248,252]
	15	[1,2,7,10,24,44,78,120,151,233,252,222,231]
13(2)	16	[2,1,4,18,26,52,112,163,227,317,390,410]
	16	[3,1,8,14,23,59,97,162,235,352,427,398]

Figure 34 Forward and reverse column weight distribution for the maximum free distance R=1/4, v=9, d_{free}=27, (1117,1365,1633,1653) code. (Continued . . .)

14	17	[2,1,6,13,38,79,128,212,320,497,577]
	16	[1,0,5,10,10,38,69,124,213,344,511,590]
15	18	[1,4,6,19,37,93,173,279,455,625]
	17	[1,1,5,9,17,44,80,170,279,452,667]
16	20	[7,8,15,50,117,198,384,540]
	19	[3,4,11,22,54,97,209,388,496]
17	21	[5,12,25,53,123,257,416]
	20	[3,6,15,26,58,127,248,409]
18	21	[1,2,20,26,56,163,239]
	20	[1,1,7,22,24,74,166,243]
19	22	[1,2,16,34,82,130]
	21	[1,3,5,22,36,86,158]
20	24	[6,11,40,80]
	22	[1,1,9,22,58,78]
21	25	[5,15,31]
	24	[2,9,28,50]
22	26	[5,9]
	25	[1,9,23]
23	26	[1,1]
	27	[6]
24	26	[1]
		[]
25	27	[1]
		[]

Figure 34 Forward and reverse column weight distribution for the maximum free distance R=1/4, v=9, d_{free}=27, (1117,1365,1633,1653) code.

1	4	[1]
	4	[1]
2	5	[1,0,1]
	6	[2]
3	6	[1,0,1,2]
	8	[4]
4	7	[1,1,1,1,2,2]
	9	[4,0,4]
5	9	[3,2,1,3,3,2,1,1]
	9	[1,2,2,4,5,2]

Figure 35 Forward and reverse column weight distribution for the maximum free distance R=1/4, v=10, d_{free}=29, (2327,2353,2671,3175) code. (Continued . . .)

6	10	[1,4,6,3,3,6,4,3,2]
	11	[3,5,4,6,7,5,2]
7	11	[1,3,7,11,6,7,12,5,5,6,1]
	12	[2,7,5,12,11,12,11,0,3,1]
8	12	[1,4,5,15,19,11,17,17,14,13,6,4,2]
	13	[2,5,12,16,17,21,21,19,9,2,3,1]
9	13	[3,2,7,15,22,35,33,28,29,30,23,13,10,5,1]
	14	[2,7,13,15,33,40,37,40,26,25,13,1,3,0,1]
10	14	[1,6,10,19,26,37,68,68,54,60,54,39,30,25,12,2]
	15	[2,4,19,28,39,55,61,82,80,58,37,24,15,3,3]
11(1)	14	[1,4,4,6,23,40,57,88,115,127,117,107,105,78,59,54]
	15	[1,0,5,18,40,53,76,114,131,135,143,126,74,51,30]
12	15	[1,1,9,19,22,43,76,123,171,210,248,235,215,200,145]
	16	[1,1,3,24,33,79,125,153,222,230,278,276,203,172]
13(1)	16	[1,0,10,20,28,67,97,159,260,334,404,455,469,410]
	16	[1,0,1,5,18,49,99,149,235,341,404,482,517,468]
14(2)	17	[1,3,6,26,41,73,138,217,354,490,655,801,825]
	17	[1,0,3,4,22,53,105,216,332,465,657,830,845]
15(1)	18	[2,1,10,27,41,112,176,274,513,711,966,1204]
	19	[4,1,9,17,44,160,252,429,704,958,1180]
16	19	[1,2,10,31,55,121,226,395,685,1010,1299]
	19	[1,1,5,14,15,56,155,335,582,932,1251]
17	21	[4,11,31,72,141,284,544,874,1219]
	21	[3,9,10,25,61,188,389,701,1111]
18	21	[1,5,8,36,82,166,362,700,1007]
	22	[2,7,23,38,63,210,450,750]
19	23	[6,15,39,83,202,440,711]
	23	[2,9,20,54,91,211,458]
20	24	[6,18,43,109,230,424]
	25	[10,29,52,136,193]
21	24	[1,6,21,53,123,219]
	26	[7,34,74,119]
22	26	[9,24,63,107]
	27	[9,33,59]
23	27	[9,20,58]
	28	[10,20]
24	27	[1,6,11]
	28	[1,4]
25	28	[2,4]
	29	[1]
26	28	[1,1]
		[]

Figure 35 Forward and reverse column weight distribution for the maximum free distance R=1/4, v=10, d_{free}=29, (2327,2353,2671,3175) code.

1	4	[1]
	4	[1]
2	6	[2]
	6	[2]
3	8	[4]
	7	[2,0,2]
4	9	[4,0,4]
	8	[1,2,2,2,1]
5	10	[2,5,4,2,2,1]
	10	[4,2,4,4,0,2]
6	11	[1,6,8,5,5,4,2,1]
	10	[1,3,1,7,11,1,3,5]
7	12	[2,4,11,8,15,12,1,8,3]
	11	[1,1,8,6,10,12,8,10,5,3]
8	13	[2,5,14,9,22,26,18,14,8,9,0,1]
	13	[4,4,11,19,17,19,15,17,15,5,2]
9	14	[3,5,14,19,25,42,40,38,33,17,10,7,3]
	14	[1,10,13,23,27,29,46,34,27,24,13,7,1,1]
10	14	[1,1,4,18,26,39,62,64,74,79,56,42,26,9,6,4,1]
	15	[1,11,13,28,52,44,65,80,65,59,39,28,18,6,3]
11	15	[2,1,4,14,34,59,83,122,124,123,151,122,74,53,33,14,6,4]
	16	[2,8,19,36,59,86,103,126,143,124,113,88,49,38,21,6,3]
12(1)	15	[1,0,4,3,14,39,76,119,169,216,257,256,234,247,174,107,72,26]
	16	[1,0,12,16,41,90,110,169,211,234,270,249,211,166,114,75,48]
13(1)	16	[1,0,1,13,16,36,100,152,223,345,433,488,495,465,445,334,228]
	18	[2,13,19,53,91,152,259,353,400,436,527,465,396,348,216]
14(2)	18	[2,3,8,22,44,115,200,309,495,675,831,930,936,921,815]
	19	[2,15,24,56,120,199,338,505,684,794,877,967,894,795]
15(4)	19	[1,8,7,23,59,111,277,424,662,1006,1321,1625,1733,1745]
	19	[1,2,10,33,69,142,265,439,710,1036,1299,1527,1757,1725]
16	20	[1,6,16,28,60,157,281,577,937,1387,2104,2508,2833]
	20	[1,2,17,26,82,177,318,604,972,1477,2011,2541,2793]
17(4)	21	[3,2,14,44,74,179,369,703,1239,1965,2942,3639]
	21	[1,4,13,37,92,214,394,786,1296,1971,3084,3645]
18	22	[1,5,17,39,116,208,458,836,1591,2801,3553]
	23	[8,12,41,122,234,487,989,1694,2753,3827]
19(2)	22	[1,1,4,16,54,127,255,545,1124,1990,3080]
	23	[1,6,12,56,120,310,606,1190,2226,3146]
20	24	[4,3,13,66,143,305,722,1326,2111]
	24	[1,5,15,55,160,335,767,1508,2311]
21	25	[4,1,23,74,148,389,829,1387]
	25	[2,4,14,56,183,422,894,1533]

Figure 36 Forward and reverse column weight distribution for the maximum free distance R=1/4, v=11, d_{free}=32, (4767,5723,6265,7455) code. (Continued . . .)

22	26	[2,9,24,70,177,468,776]
	26	[1,6,18,66,176,491,918]
23	27	[2,5,40,69,220,407]
	27	[1,8,19,71,205,429]
24	28	[3,9,33,98,177]
	29	[9,26,71,171]
25	29	[2,13,41,74]
	30	[10,24,61]
26	29	[1,1,19,25]
	31	[10,17]
27	30	[1,6,8]
	31	[1,4]
28	31	[1,3]
	32	[1]
29	31	[1]
		[]
30	32	[1]
		[]

Figure 36 Forward and reverse column weight distribution for the maximum free distance R=1/4, v=11, d_{free}=32, (4767,5723,6265,7455) code.

1	4	[1]
	4	[1]
2	6	[2]
	5	[1,0,1]
3	8	[4]
	7	[2,1,0,1]
4	8	[1,0,6,0,1]
	8	[1,3,1,1,2]
5	9	[1,0,7,0,7,0,1]
	10	[3,5,3,2,1,1,1]
6	9	[1,0,0,4,8,8,4,4,3]
	11	[3,6,5,5,6,4,1,1,1]
7	11	[2,1,3,8,11,14,9,8,7,1]
	12	[1,8,11,8,10,10,8,4,1,2,1]
8	12	[2,0,6,8,16,20,24,20,14,12,2,4]
	13	[1,7,13,18,19,18,18,12,11,7,1,2,1]
9	12	[1,0,3,1,16,21,26,34,51,32,25,35,4,3,2,2]
	14	[3,6,10,26,36,31,40,34,21,26,12,4,4,1,2]

Figure 37 Forward and reverse column weight distribution for the maximum free distance R=1/4, v=12, d_{free}=33, (11145,12477,15573,16727) code. (Continued . . .)

10	13	[1,1,3,1,18,22,48,45,77,79,64,67,40,32,4,7,0,2,1]
	15	[1,10,15,25,48,61,66,74,65,46,43,29,14,9,4,0,0,2]
11	14	[1,0,4,8,14,25,54,88,114,135,140,130,110,95,54,28,17,1,4,2]
	16	[2,5,22,36,58,82,12,148,112,118,110,76,66,34,14,12,2,1]
12	16	[3,2,7,22,35,71,92,174,237,249,274,232,233,177,100,78,36,13]
	17	[2,10,15,45,77,123,172,232,262,226,235,205,163,121,70,46,22]
13	16	[1,2,1,12,18,49,93,140,221,328,423,517,519,456,423,339,254,136]
	17	[1,3,9,16,50,93,177,246,347,437,463,492,445,396,303,248,165]
14	18	[3,5,8,25,55,106,210,315,447,648,824,964,997,919,790,645]
	18	[1,3,10,24,50,122,209,354,517,661,841,916,928,870,760,606]
15(1)	19	[5,4,11,28,52,151,255,434,681,890,1284,1622,1824,1932,1673]
	19	[2,2,9,26,64,137,277,475,729,1009,1313,1629,1744,1788,1642]
16(2)	20	[1,12,12,39,54,169,326,573,957,1334,1934,2492,3119,3328]
	20	[3,0,7,44,70,157,335,589,1028,1516,2030,2606,3060,3203]
17(1)	21	[3,7,19,40,92,191,404,690,1245,2054,2798,3815,4618]
	20	[1,2,1,9,36,97,199,384,781,1325,2105,3104,4038,4707]
18	21	[1,3,6,24,46,109,226,489,937,1620,2706,4118,5175]
	22	[3,5,9,42,103,230,495,942,1739,2957,4329,5485]
19	21	[1,1,1,9,24,47,135,318,573,1145,2138,3595,4984]
	22	[1,2,2,17,46,117,287,578,1178,2248,3834,5372]
20(1)	22	[1,1,3,15,19,65,137,359,788,1376,2766,4085]
	23	[1,3,4,17,56,120,333,735,1431,2833,4352]
21	23	[1,0,6,11,34,63,175,438,907,1786,2896]
	24	[2,2,8,14,57,161,383,867,1822,2872]
22	24	[1,0,7,12,38,80,210,497,1138,1787]
	25	[3,1,6,24,64,187,440,1035,1753]
23	25	[1,1,8,13,42,92,248,591,1113]
	26	[1,6,8,26,70,203,559,945]
24	27	[5,2,20,53,110,292,532]
	27	[1,5,10,40,89,224,461]
25	27	[1,4,4,22,57,135,270]
	27	[1,1,4,11,43,106,204]
26	28	[2,2,8,17,78,112]
	27	[1,1,0,4,17,41,91]
27	28	[2,1,3,3,25,51]
	29	[2,3,1,20,35]
28	29	[2,2,3,4,24]
	30	[1,3,9,13]
29	29	[1,1,2,4,7]
	31	[1,3,7]
30	30	[1,1,3,5]
	31	[1,0,1]

Figure 37 Forward and reverse column weight distribution for the maximum free distance R=1/4, v=12, d_{free}=33, (11145,12477,15573,16727) code. (Continued . . .)

31	30 33	[1,0,1,2] [2]
32	31	[1,0,2] []
33	32	[1] []
34	33	[1] []

Figure 37 Forward and reverse column weight distribution for the maximum free distance R=1/4, v=12, d_{free}=33, (11145,12477,15573,16727) code.

1	4 4	[1] [1]
2	6 5	[2] [1,0,1]
3	6 7	[1,0,2,0,1] [2,1,0,1]
4	7 8	[1,0,3,0,3,0,1] [1,2,3,1,0,1]
5	8 9	[1,2,2,0,2,6,2,0,1] [1,2,4,3,3,2,0,1]
6	8 11	[1,1,2,0,4,3,6,7,3,4,0,1] [3,5,6,7,4,3,2,1,1]
7	9 11	[1,0,4,2,6,3,9,12,8,8,3,6,1,1] [1,1,5,10,11,13,9,5,4,2,2,1]
8	11 12	[3,3,2,9,10,13,13,16,20,10,13,10,3,2,0,1] [1,1,5,11,20,23,14,18,17,7,5,3,2,1]
9	11 14	[2,0,6,5,9,12,22,29,23,35,25,29,25,16,10,1,5,1,1] [3,6,11,22,37,39,33,34,27,18,11,8,5,1,1]
10	12 14	[1,5,4,6,13,21,34,38,41,57,68,50,45,51,34,18,10,10,4,0,2] [1,2,6,15,22,49,67,72,75,56,48,35,28,21,7,6,2]
11	14 15	[5,6,9,17,23,48,60,80,91,98,134,102,93,100,60,40,24,20,9,1,4] [1,2,7,16,35,57,86,125,134,138,125,90,75,53,36,25,11,6,2]
12	15 15	[2,9,16,24,34,50,95,124,157,190,185,228,225,192,179,116,85,65,35,20,9,6] [1,0,0,10,17,40,82,118,177,229,248,260,239,191,154,110,70,51,28,14,8,1]
13	16 17	[4,11,14,40,48,64,139,158,256,332,327,413,406,430,409,313,266,161,127,95,42] [2,2,7,23,43,87,179,254,342,443,463,492,464,381,311,218,160,103,62,37]
14(1)	17 17	[3,13,21,41,68,107,170,255,376,474,613,728,746,816,834,748,653,523,349,246] [1,1,3,4,26,64,100,204,364,531,681,801,904,963,910,733,597,478,315,217]

Figure 38 Forward and reverse column weight distribution for the maximum free distance R=1/4, v=13, d_{free}=36, (21113,23175,25527,35537) code. (Continued . . .)

15(1)	18	[5,9,27,55,73,150,254,360,531,743,991,1179,1386,1561,1596,1562,1405,1307,1006]
	17	[1,0,0,3,11,28,55,136,279,460,720,1050,1339,1563,1766,1845,1711,1461,1216,917]
16(2)	19	[3,11,27,60,119,179,336,545,747,1126,1559,1897,2322,2741,2975,3154,3046,2659]
	19	[2,0,4,11,32,71,151,339,617,965,1480,2128,2605,3051,3440,3492,3332,2774]
17(3)	21	[19,28,65,160,240,432,734,1113,1621,2306,3083,3812,4658,5314,5774,5791]
	20	[1,2,5,14,37,80,192,402,748,1323,2079,3065,4177,5148,5990,6592,6394]
18(4)	21	[5,15,32,69,188,340,576,981,1540,2300,3409,4775,6094,7735,9195,9557]
	22	[3,7,17,49,89,224,465,956,1805,2758,4297,6293,8255,10221,10827]
19	21	[1,4,13,37,88,205,433,764,1282,2119,3323,4930,7066,9655,12351,13974]
	22	[1,2,5,22,51,119,290,562,1156,2156,2197,3759,6133,9024,12625,15020]
20(3)	21	[1,0,3,17,31,117,245,498,957,1723,2986,4554,7013,10444,14541,17465]
	24	[3,14,14,46,160,333,727,1449,2705,4962,8251,12744,16679]
21(1)	21	[1,0,1,4,9,53,117,302,662,1142,2202,3893,6444,9865,14770,19496]
	25	[2,15,22,58,165,399,887,1818,3485,6284,10967,15438]
22(2)	23	[2,1,2,6,57,141,360,771,1479,2832,5044,8682,13771,18413]
	25	[1,3,10,28,86,179,463,1060,2233,4399,8060,12215]
23(2)	24	[2,1,3,11,53,143,413,940,1913,3532,6508,11606,16144]
	27	[7,11,31,94,218,557,1252,2729,5434,8577]
24	25	[2,2,7,8,44,185,467,1099,2318,4466,8495,12767]
	28	[5,12,49,116,244,636,1502,3317,5454]
25	26	[1,3,7,20,63,192,505,1315,2797,5630,8946]
	28	[1,3,18,46,123,340,758,1786,3146]
26	27	[1,2,6,30,79,220,562,1506,3383,5608]
	29	[1,7,16,53,148,376,941,1661]
27	29	[2,9,17,125,207,710,1753,3078]
	30	[1,5,21,70,153,481,803]
28	30	[3,6,29,121,267,803,1561]
	31	[1,8,24,72,207,386]
29	31	[2,8,34,124,328,678]
	31	[1,1,7,23,87,169]
30	32	[1,12,33,126,299]
	32	[1,1,8,36,55]
31	33	[6,10,42,83]
	33	[2,1,9,28]
32	33	[1,1,20,35]
	34	[2,3,7]
33	35	[4,13]
	34	[1,1,1]
34	35	[1]
	34	[3]

Figure 38 Forward and reverse column weight distribution for the maximum free distance R=1/4, v=13, d_{free}=36, (21113,23175,25527,35537) code.

Appendix D Optimum Distance Profile R=1/2 Codes

This appendix containes the forward and reverse column weight distributions for the optimum distance profile (ODP) convolutional codes of rate R=1/2 and memory v=1 to 23.

1	2	[1]
	1	[1]
2(1)	3	[2]
	2	[1,1]
3		[]
	3	[1]

Figure 39 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=1, d_{free}=3, (3,2) code.

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3(1)	3	[1,2,1]
	3	[1,2,1]
4	4	[3,2]
	4	[3,2]
5	4	[1,4]
	4	[1,4]
6	5	[2]
	5	[2]

Figure 40 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=2, d_{free}=5, (5,7) code.

1	2	[1]
	2	[1]
2	3	[2]
	2	[1,0,1]
3	3	[1,2,1]
	3	[2,0,2]
4	4	[3,3,1]
	4	[4,2]
5(1)	4	[2,3,6]
	4	[2,5,4]
6	5	[6,2]
	4	[1,4,7]
7	5	[3,6]
	5	[5,2]
8	6	[6]
	5	[1,8]
9		[]
	6	[2]

Figure 41 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=3, d_{free}=6, (17,13) code.

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3	3	[1,2,1]
	3	[1,2,1]
4	4	[3,3,1,1]
	3	[1,1,3,3]
5(1)	4	[2,3,6,3]
	3	[1,1,2,6,5]

Figure 42 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=4, d_{free}=7, (31,27) code. (Continued . . .)

6	4	[2,1,8,9]
	4	[2,3,5,7]
7	5	[5,4,9]
	4	[1,3,8,5]
8(1)	5	[2,8,6]
	4	[1,1,9,9]
9	5	[1,5,11]
	5	[2,6,10]
10	5	[1,2,7]
	5	[1,5,7]
11	6	[3,2]
	6	[5,4]
12	6	[1,4]
	6	[2,6]
13	7	[2]
	7	[4]

Figure 42 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=4, d_{free}=7, (31,27) code.

10	6	[2,20,14]
	6	[12,30,18]
11(1)	6	[2,10,22]
	6	[5,31,31]
12	7	[7,14]
	6	[2,21,34]
13	7	[3,8]
	6	[2,12,20]
14	7	[1,4]
	6	[1,5,19]
15	8	[2]
	7	[4,6]
16		[]
	7	[3,2]
17		[]
	8	[6]

Figure 43 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=5, d_{free}=8, (75,55) code.

1	2	[1]
	2	[1]
2	3	[2]
	2	[1,0,1]
3	3	[1,2,1]
	2	[1,0,2,0,1]
4	4	[3,3,1,1]
	2	[1,0,3,0,3,0,1]
5	4	[2,3,6,4]
	3	[2,0,6,0,6]
6	5	[6,6,8,8]
	3	[2,0,6,4,6,8]
7	5	[3,9,13,11]
	4	[4,2,8,14,4]
8(1)	5	[1,9,16,17]
	5	[8,8,18,12]
9	6	[7,16,21]
	5	[4,12,21,22]

Figure 43 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=5, d_{free}=8, (75,55) code. (Continued . . .)

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3	3	[1,2,1]
	3	[1,2,1]
4	4	[3,3,1,1]
	3	[1,1,3,3]
5	4	[2,3,6,4,0,1]
	3	[1,1,2,6,5,1]
6	5	[6,6,8,8,2,2]
	3	[1,1,2,6,9,9,4]
7(1)	5	[3,9,13,15,13,6]
	3	[1,1,2,7,10,15,18,9]
8(1)	6	[11,18,18,30,25]
	4	[2,3,4,14,24,28,22]
9(1)	6	[5,22,30,42,41]
	4	[1,4,5,12,30,44,40]

Figure 44 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=6, d_{free}=10, (147,135) code. (Continued . . .)

10(2)	6	[2,18,37,61,61]
	5	[3,9,11,27,66,52]
11(2)	6	[2,9,36,80,80]
	5	[1,9,15,26,72,75]
12(1)	6	[1,7,26,83,97]
	5	[1,5,16,34,70,83]
13(1)	7	[4,24,72,88]
	5	[1,4,12,33,81,87]
14(1)	7	[3,12,68,80]
	6	[3,9,33,90,78]
15(1)	7	[1,10,49,70]
	6	[1,7,30,83,101]
16(1)	7	[1,3,43,45]
	6	[1,4,21,78,96]
17	8	[3,27,41]
	6	[1,1,15,67,84]
18	8	[1,16,31]
	6	[1,1,10,48,73]
19	9	[10,16]
	7	[2,5,34,59]
20	9	[4,12]
	7	[1,4,23,38]
21	9	[2,4]
	8	[4,14,28]
22	9	[1,2]
	8	[3,8,19]
23	9	[1]
	8	[1,7,11]
24	9	[1]
	9	[5,8]
25	10	[2]
	9	[1,8]
26		[]
	10	[2]

Figure 44 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=6, d_{free}=10, (147,135) code.

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3	3	[1,2,1]
	3	[1,2,1]
4	4	[3,3,1,1]
	3	[1,1,3,3]
5	4	[2,3,6,4,0,1]
	3	[1,1,2,6,5,1]
6	5	[6,6,8,8,2,2]
	4	[2,3,5,10,8,3,1]
7	5	[3,9,13,15,13,6]
	4	[1,4,5,12,19,12,7]
8	6	[11,18,18,30,25]
	5	[3,9,13,21,31,24]
9	6	[5,22,30,42,41]
	5	[1,9,16,26,48,37]
10	6	[3,14,42,63,53]
	6	[7,16,33,62,56]
11	6	[3,2,30,80,103]
	6	[4,15,32,74,84]
12	6	[1,7,26,83,97]
	6	[3,9,34,78,89]
13	7	[7,17,75,87]
	6	[1,9,26,78,95]
14(1)	7	[2,12,46,58]
	6	[1,6,19,71,94]
15	7	[2,12,46,58]
	7	[6,12,58,86]
16	7	[2,6,34,58]
	7	[4,10,45,64]
17	8	[6,24,38]
	7	[3,9,32,51]
18	8	[3,20,23]
	8	[10,29,30]
19	8	[1,17,15]
	8	[4,27,32]
20	8	[1,6,23]
	8	[3,14,33]
21	9	[2,12]
	9	[9,22]

Figure 45 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=7, d_{free}=10, (313,275) code. (Continued . . .)

22	9	[1,2]
	9	[3,12]
23	9	[1]
	9	[1,4]
24	10	[2]
	10	[2]

Figure 45 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=7, d_{free}=10, (313,275) code.

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3	3	[1,2,1]
	3	[1,2,1]
4	4	[3,3,1,1]
	4	[3,3,1,1]
5	4	[2,3,6,4,0,1]
	4	[1,6,4,2,3]
6	5	[6,6,8,8,2,2]
	5	[5,9,6,6,5,1]
7	5	[3,9,13,15,13,7,3,1]
	5	[3,8,15,16,9,8,5]
8	6	[11,18,18,30,28,14,5]
	5	[2,6,16,30,28,18,16,10]
9	6	[6,18,35,42,50,54,25]
	5	[2,3,14,38,50,52,42,21]
10(1)	6	[5,9,41,72,79,98,77]
	5	[1,3,12,36,66,94,104,65]
11(1)	6	[3,7,38,73,136,174,121]
	6	[3,11,29,75,136,174,150]
12(1)	7	[11,22,85,153,256,253]
	6	[2,7,28,74,152,265,242]
13	7	[6,21,69,174,327,327]
	6	[1,6,22,64,166,336,321]
14(4)	7	[5,10,65,166,362,430]
	6	[1,5,14,54,163,373,410]

Figure 46 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=8, d_{free}=12, (751,557) code. (Continued . . .)

15(2)	7	[3,9,46,149,381,452]
	7	[5,12,40,145,378,455]
16	7	[2,7,31,132,352,465]
	7	[3,10,35,118,351,458]
17	8	[6,28,93,333,407]
	7	[1,7,36,94,293,441]
18(1)	8	[3,21,76,268,391]
	7	[1,4,25,89,249,353]
19	8	[2,13,59,224,303]
	7	[1,3,15,74,227,289]
20	8	[1,10,39,184,248]
	8	[3,10,52,211,241]
21	8	[1,4,30,148,185]
	8	[1,7,42,160,235]
22	9	[2,22,106,162]
	9	[5,32,118,186]
23	9	[1,15,66,131]
	9	[3,20,90,142]
24	10	[9,50,71]
	9	[2,10,72,96]
25	10	[3,38,51]
	9	[1,8,44,80]
26	10	[1,20,45]
	10	[5,34,43]
27	11	[12,20]
	10	[3,22,35]
28	11	[7,10]
	11	[17,22]
29	11	[3,8]
	11	[6,22]
30	11	[1,4]
	11	[3,6]
31	12	[2]
	11	[2,2]
32		[]
	11	[2]
33		[]
	11	[1,2]
34		[]
	12	[2]

Figure 46 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=8, d_{free}=12, (751,557) code.

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3	3	[1,2,1]
	3	[1,2,1]
4	4	[3,3,1,1]
	4	[3,3,1,1]
5	4	[2,3,6,4,0,1]
	4	[1,6,4,2,3]
6	5	[6,6,8,8,2,2]
	5	[5,9,6,6,5,1]
7	5	[3,9,13,15,13,7,3,1]
	5	[2,11,14,11,14,9,2,1]
8	6	[11,18,18,30,28,14,5]
	5	[1,8,17,27,27,19,19,8]
9	6	[5,22,30,42,56,46,31]
	6	[7,14,35,54,44,42,32]
10	6	[2,18,37,61,92,92,77]
	6	[2,19,31,66,100,86,69]
11(1)	7	[13,39,73,123,170,144]
	6	[1,11,37,74,126,179,140]
12	7	[7,31,82,158,241,231]
	6	[1,5,32,77,155,263,228]
13	7	[4,22,72,182,324,308]
	6	[1,2,23,73,169,325,343]
14	7	[1,18,59,167,393,405]
	7	[3,10,72,168,342,436]
15	8	[9,56,144,380,501]
	7	[2,5,52,167,355,442]
16	8	[3,41,133,353,460]
	7	[1,4,34,134,377,432]
17	9	[26,112,327,414]
	7	[1,2,21,104,346,432]
18	9	[12,85,287,381]
	8	[3,12,72,303,375]
19	9	[6,54,238,324]
	8	[1,10,50,230,335]
20	9	[5,26,178,274]
	9	[9,32,160,276]
21	9	[4,17,115,193]
	9	[3,30,110,180]

Figure 47 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=9, d_{free}=12, (1755,1363) code. (Continued . . .)

22	9	[1,16,75,120]
	9	[1,19,88,121]
23	10	[10,51,88]
	9	[1,9,64,99]
24	10	[6,30,64]
	9	[1,3,43,71]
25	10	[3,23,29]
	9	[1,1,29,39]
26	11	[18,22]
	10	[3,15,29]
27	11	[10,16]
	10	[2,10,16]
28	11	[4,12]
	11	[9,10]
29	12	[8]
	11	[6,6]
30	11	[]
	11	[4,4]
31	12	[]
	11	[2,4]
32		[]
	12	[4]

Figure 47 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=9, d_{free}=12, (1755,1363) code.

1	2	[1]
	2	[1]
2	3	[2]
	2	[1,0,1]
3	3	[1,2,1]
	3	[2,0,2]
4	4	[3,3,1,1]
	4	[4,2,0,2]
5	4	[2,3,6,4,0,1]
	4	[2,5,4,2,2,1]
6	5	[6,6,8,8,2,2]
	4	[1,5,6,10,5,1,4]

Figure 48 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=10, d_{free}=14, (3645,2671) code. (Continued . . .)

7	5	[3,9,13,15,13,7,3,1]
	5	[5,7,13,19,7,5,7,1]
8	6	[11,18,18,30,28,14,6,2,1]
	5	[3,7,17,27,21,11,9,6]
9	6	[5,22,30,42,56,46,34,14,3]
	5	[1,8,16,32,54,48,36,32,17,8]
10	6	[3,14,42,63,78,108,92,54,39]
	5	[1,4,16,39,64,92,100,74,53,37]
11(1)	7	[13,39,74,121,167,198,172,94]
	5	[1,1,14,43,70,126,185,182,149,86]
12	7	[5,37,82,145,246,332,369,262]
	6	[3,6,38,88,146,261,339,341,248]
13(1)	7	[2,26,75,179,311,466,665,521]
	7	[9,25,88,181,303,517,650,497]
14(3)	7	[2,15,55,190,375,625,964,878]
	7	[3,27,69,180,404,643,959,950]
15(2)	8	[12,39,172,389,764,1336,1258]
	7	[2,16,62,171,418,828,1316,1267]
16(2)	8	[4,40,116,402,850,1608,1750]
	7	[1,11,47,150,414,938,1677,1719]
17(3)	8	[1,26,104,324,885,1891,1988]
	8	[5,39,132,380,932,1997,2167]
18(1)	9	[18,68,289,817,1987,2341]
	8	[3,24,111,320,933,2170,2369]
19(3)	9	[8,55,223,713,1985,2376]
	8	[2,16,76,279,866,2160,2632]
20(1)	9	[4,33,185,581,1803,2402]
	9	[11,61,206,768,2096,2559]
21	9	[2,19,134,483,1572,2108]
	9	[6,37,177,630,1896,2487]
22(2)	9	[1,13,82,388,1349,1791]
	9	[4,22,134,497,1666,2237]
23	9	[1,5,55,294,1096,1531]
	9	[3,14,95,368,1426,1916]
24	9	[1,4,34,197,862,1271]
	9	[1,10,67,287,1097,1657]
25	9	[1,1,18,148,657,917]
	9	[1,4,46,213,872,1241]
26	9	[1,0,12,88,506,702]
	9	[1,3,24,150,691,965]
27	10	[2,7,49,356,549]
	10	[3,16,94,522,755]

Figure 48 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=10, d_{free}=14, (3645,2671) code. (Continued . . .)

28	10	[1,6,30,238,371]
	10	[2,7,72,371,544]
29	11	[7,13,155,263]
	10	[1,5,42,274,389]
30	11	[4,13,89,171]
	11	[5,27,157,339]
31	11	[2,10,51,114]
	11	[1,25,94,185]
32	12	[8,33,64]
	11	[1,9,78,107]
33	12	[4,21,44]
	12	[7,42,93]
34	12	[1,17,21]
	12	[5,24,49]
35	13	[14,10]
	12	[1,16,33]
36	13	[10,8]
	12	[1,6,21]
37	13	[4,12]
	12	[1,4,5]
38	13	[2,4]
	13	[4,4]
39	13	[1,2]
	13	[2,4]
40	14	[2]
	14	[4]

Figure 48 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=10, d_{free}=14, (3645,2671) code.

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3	3	[1,2,1]
	3	[1,2,1]
4	4	[3,3,1,1]
	4	[3,3,1,1]

Figure 49 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=11, d_{free}=14, (6643,5175) code. (Continued . . .)

5	4	[2,3,6,4,0,1]
	4	[1,6,4,2,3]
6	5	[6,6,8,8,2,2]
	4	[1,3,8,10,5,3,2]
7	5	[3,9,13,15,13,7,3,1]
	4	[1,1,9,15,13,15,7,1,2]
8	6	[11,18,18,30,28,14,6,2,1]
	5	[3,4,18,28,24,28,14,4,5]
9	6	[6,18,35,42,50,54,28,14,7]
	5	[1,6,15,32,50,52,46,32,13,6]
10	6	[1,21,36,58,90,98,96,60,25]
	5	[1,2,17,34,58,100,98,84,69,22]
11	7	[12,42,73,116,173,196,170,106]
	5	[1,1,10,40,69,115,188,200,155,108]
12	7	[5,36,84,147,240,333,373,256]
	5	[1,1,6,31,78,148,245,344,373,252]
13	8	[29,83,164,305,489,653,522]
	5	[1,1,4,23,72,168,306,491,668,529]
14	8	[12,80,171,351,644,958,911]
	6	[2,4,14,62,174,351,627,996,899]
15	8	[6,51,175,387,744,1309,1289]
	6	[1,3,14,48,153,379,756,1303,1300]
16	8	[3,35,129,398,877,1565,1669]
	6	[1,1,12,39,134,367,817,1606,1698]
17	8	[2,16,111,348,873,1876,2016]
	7	[3,8,23,126,331,831,1837,1979]
18	8	[1,8,80,287,828,2014,2289]
	7	[1,8,24,78,312,816,1912,2242]
19(1)	9	[8,43,226,757,1963,2430]
	8	[5,20,71,248,754,1920,2330]
20	9	[2,35,160,609,1886,2308]
	8	[4,13,59,194,676,1848,2271]
21	9	[2,14,125,488,1601,2220]
	8	[3,8,40,176,579,1664,2176]
22	10	[14,69,382,1344,1856]
	8	[2,5,33,129,488,1494,1959]
23	10	[8,48,264,1076,1566]
	8	[1,4,20,102,407,1286,1720]
24	10	[5,26,196,827,1189]
	9	[3,12,86,296,1111,1492]
25	10	[4,16,128,619,928]
	9	[2,6,62,239,878,1285]

Figure 49 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=11, d_{free}=14, (6643,5175) code. (Continued . . .)

26	10	[2,15,77,442,693]
	10	[8,40,171,714,1011]
27	10	[1,9,57,302,482]
	10	[4,28,126,567,772]
28	10	[1,7,32,215,335]
	10	[2,19,92,425,626]
29	10	[1,1,30,137,235]
	10	[1,13,59,331,452]
30	11	[3,13,102,153]
	10	[1,6,45,228,364]
31	11	[1,9,71,101]
	11	[6,34,148,258]
32	11	[1,5,41,83]
	11	[3,22,110,170]
33	12	[6,25,40]
	11	[1,18,76,116]
34	12	[1,24,23]
	12	[13,44,103]
35	12	[1,12,25]
	12	[5,36,53]
36	12	[1,3,19]
	12	[5,18,41]
37	13	[3,4]
	12	[3,10,27]
38	13	[1,4]
	12	[2,5,16]
39	13	[1]
	13	[6,6]
40	14	[2]
	13	[2,8]
41		[]
	13	[2]
42		[]
	13	[1,2]
43		[]
	14	[2]

Figure 49 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=11, d_{free}=14, (6643,5175) code.

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3	3	[1,2,1]
	3	[1,2,1]
4	4	[3,3,1,1]
	4	[3,3,1,1]
5	4	[2,3,6,4,0,1]
	4	[1,6,4,2,3]
6	5	[6,6,8,8,2,2]
	4	[1,3,8,10,5,3,2]
7	5	[3,9,13,15,13,7,3,1]
	4	[1,1,9,15,13,15,7,1,2]
8	6	[11,18,18,30,28,14,6,2,1]
	5	[3,4,18,28,24,28,14,4,5]
9	6	[6,18,35,42,50,54,28,14,7]
	5	[1,6,15,32,50,52,46,32,13,6]
10	6	[1,21,36,58,90,98,96,60,25]
	5	[1,2,17,34,58,100,98,84,69,22]
11	7	[12,42,73,116,173,196,170,106]
	5	[1,1,10,40,69,115,188,200,155,108]
12	7	[5,36,84,147,240,333,373,256]
	5	[1,1,6,31,78,148,245,344,373,252]
13	8	[29,83,164,305,489,653,522]
	5	[1,1,4,23,72,168,306,491,668,529]
14	8	[12,80,171,351,644,958,911]
	6	[2,4,14,62,174,351,627,996,899]
15	8	[6,51,175,387,744,1309,1289]
	6	[1,3,14,48,153,379,756,1303,1300]
16	8	[3,35,129,398,877,1565,1669]
	6	[1,1,12,39,134,367,817,1606,1698]
17	8	[2,16,111,348,873,1876,2016]
	7	[3,8,23,126,331,831,1837,1979]
18	8	[1,8,80,287,828,2014,2289]
	7	[1,8,24,78,312,816,1912,2242]
19(1)	9	[8,43,226,757,1963,2430]
	8	[5,20,71,248,754,1920,2330]
20	9	[2,35,160,609,1886,2308]
	8	[4,13,59,194,676,1848,2271]

Figure 50 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=12, d_{free}=15, (14677,11651) code. (Continued . . .)

21	9	[2,14,125,488,1601,2220]
	8	[3,8,40,176,579,1664,2176]
22	10	[14,69,382,1344,1856]
	8	[2,5,33,129,488,1494,1959]
23	10	[8,48,264,1076,1566]
	8	[1,4,20,102;407,1286,1720]
24	10	[5,26,196,827,1189]
	9	[3,12,86,296,1111,1492]
25	10	[4,16,128,619,928]
	9	[2,6,62,239,878,1285]
26	10	[2,15,77,442,693]
	10	[8,40,171,714,1011]
27	10	[1,9,57,302,482]
	10	[4,28,126,567,772]
28	10	[1,7,32,215,335]
	10	[2,19,92,425,626]
29	10	[1,1,30,137,235]
	10	[1,13,59,331,452]
30	11	[3,13,102,153]
	10	[1,6,45,228,364]
31	11	[1,9,71,101]
	11	[6,34,148,258]
32	11	[1,5,41,83]
	11	[3,22,110,170]
33	12	[6,25,40]
	11	[1,18,76,116]
34	12	[1,24,23]
	12	[13,44,103]
35	12	[1,12,25]
	12	[5,36,53]
36	12	[1,3,19]
	12	[5,18,41]
37	13	[3,4]
	12	[3,10,27]
38	13	[1,4]
	12	[2,5,16]
39	13	[1]
	13	[6,6]
40	14	[2]
	13	[2,8]

Figure 50 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=12, d_{free}=15, (14677,11651) code. (Continued . . .)

41		[]
	13	[2]
42		[]
	13	[1,2]
43		[]
	14	[2]

Figure 50 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=12, d_{free}=15, (14677,11651) code.

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3	3	[1,2,1]
	3	[1,2,1]
4	4	[3,3,1,1]
	4	[3,3,1,1]
5	4	[2,3,6,4,0,1]
	4	[2,3,6,4,0,1]
6	5	[6,6,8,8,2,2]
	5	[6,6,8,8,2,2]
7	5	[3,9,13,15,13,7,3,1]
	5	[3,9,13,15,13,7,3,1]
8	6	[11,18,18,30,28,14,6,2,1]
	5	[3,4,16,32,26,20,16,8,3]
9	6	[6,18,35,42,50,54,28,14,8,0,1]
	5	[1,6,14,32,54,52,40,32,17,6,2]
10	6	[1,21,36,58,90,98,96,60,29,17,4]
	5	[1,2,16,35,58,100,104,78,61,34,16,7]
11	7	[12,42,73,116,173,196,170,120,70,32]
	6	[3,11,31,75,130,174,190,166,119,71,31]
12	7	[5,36,84,147,240,333,373,318,237,140]
	6	[1,9,30,72,153,257,334,360,323,235,129]
13	8	[29,83,164,305,489,653,688,615,400]
	7	[7,25,63,169,333,483,625,711,633,376]
14	8	[12,80,171,351,644,958,1265,1305,948]
	7	[5,17,56,166,373,655,954,1224,1341,994]

Figure 51 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=13, d_{free}=16, (22555,37457) code. (Continued . . .)

15	8	[6,53,168,386,773,1288,1891,2422,1940]
	7	[4,10,46,160,365,778,1359,1860,2349,1998]
16(1)	8	[1,38,139,382,856,1606,2644,3722,3376]
	7	[3,5,338,141,351,825,1647,2701,3729,3216]
17(1)	8	[1,22,98,350,905,1837,3340,5308,5060]
	7	[2,5,27,105,329,866,1814,3366,5442,5054]
18	8	[1,9,77,287,829,2018,3984,6857,7013]
	7	[1,4,21,81,281,821,1930,3929,7006,7113]
19	8	[1,3,50,231,738,1967,4408,8462,8851]
	7	[1,2,15,66,229,731,1929,4301,8392,8992]
20	9	[3,30,169,607,1856,4572,9557,10693]
	8	[4,9,40,204,636,1760,4473,9535,10431]
21(1)	9	[1,16,123,495,1594,4452,10274,11873]
	8	[2,10,29,146,536,1605,4384,10119,11653]
22(1)	9	[1,7,80,382,1349,4047,10420,12492]
	8	[1,7,26,103,438,1412,4031,10293,12290]
23	10	[6,49,262,1111,3576,9895,12468]
	9	[5,21,74,352,1204,3605,9884,12352]
24	10	[4,29,179,856,3005,9080,11722]
	9	[2,17,59,257,1005,3177,9115,11735]
25	10	[2,21,118,610,2453,7978,10601]
	9	[1;12,44,198,788,2713,8279,10651]
26	10	[1,10,89,425,1896,6785,9136]
	10	[6,39,147,608,2256,7213,9683]
27	10	[1,4,56,314,1403,5502,7748]
	10	[3,25,113,488,1792,6121,8430]
28(1)	10	[1,3,26,232,1040,4259,6279]
	10	[2,16,79,371,1448,5086,7023]
29	10	[1,0,17,155,748,3301,4762]
	11	[14,49,267,1170,4165,5769]
30	10	[1,0,10,92,546,2478,3653]
	11	[8,34,199,881,3345,4797]
31	10	[1,0,2,65,374,1812,2761]
	11	[4,26,136,645,2669,3789]
32	11	[2,2,31,262,1294,2018]
	12	[23,98,446,2058,3021]
33	11	[1,2,19,156,942,1414]
	12	[10,74,337,1519,2277]
34	12	[3,12,101,627,1028]
	12	[8,45,235,1161,1663]

Figure 51 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=13, d_{free}=16, (22555,37457) code. (Continued . . .)

35	12	[1,11,65,414,682]
	12	[3,32,160,845,1283]
36	12	[1,4,46,290,423]
	12	[1,19,117,580,954]
37	12	[1,2,34,185,311]
	13	[12,78,410,648]
38	13	[3,21,132,187]
	13	[6,52,286,452]
39	13	[1,14,92,136]
	13	[4,36,188,316]
40	14	[8,67,88]
	13	[1,27,134,191]
41	14	[4,39,76]
	14	[18,91,146]
42	14	[2,20,48]
	14	[10,60,104]

Figure 51 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=13, d_{free}=16, (22555,37457) code. (Continued . . .)

43	14	[2,8,26]
	14	[6,37,68]
44	14	[1,7,7]
	14	[1,23,49]
45	15	[6,6]
	15	[13,24]
46	15	[4,4]
	15	[7,12]
47	15	[1,6]
	15	[3,8]
48	15	[1]
	15	[1,4]
49	15	[1]
	16	[2]
50	16	[2]
		[]

Figure 51 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=13, d_{free}=16, (22555,37457) code.

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3	3	[1,2,1]
	3	[1,2,1]
4	4	[3,3,1,1]
	4	[3,3,1,1]
5	4	[2,3,6,4,0,1]
	4	[1,6,4,2,3]
6	5	[6,6,8,8,2,2]
	5	[5,9,6,6,5,1]
7	5	[3,9,13,15,13,7,3,1]
	5	[3,8,15,16,9,8,5]
8	6	[11,18,18,30,28,14,6,2,1]
	5	[1,8,18,24,28,24,14,8,3]
9	6	[6,18,35,42,50,54,28,14,8,0,1]
	6	[6,18,32,48,52,44,32,16,6,2]
10	6	[1,21,36,58,90,98,96,60,29,17,4,2]
	6	[3,15,37,65,90,98,86,62,35,15,5,1]

Figure 52 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=14, d_{free}=17, (65231,43677) code. (Continued . . .)

11	7	[12,42,73,116,173,196,170,120,70,34,12]
	6	[2,10,32,82,130,164,192,164,118,82,32,10]
12	7	[5,36,84,147,240,333,373,318,237,158,63]
	6	[2,4,28,86,150,250,348,348,302,248,164,72]
13	8	[29,83,164,305,489,653,688,615,479,278]
	6	[2,2,20,71,174,332,484,645,690,578,492,292]
14	8	[17,61,188,365,619,978,1218,1339,1223,749]
	6	[1,2,18,47,171,396,624,989,1259,1250,1198,788]
15	8	[10,40,179,386,763,1333,1839,2393,2603,1840]
	6	[1,1,13,38,148,396,765,1348,1947,2334,2491,1833]
16	8	[7,21,151,377,857,1644,2601,3739,4579,3817]
	7	[3,6,34,118,358,872,1637,2671,3791,4587,3645]
17	8	[2,26,80,372,872,1871,3376,5238,7442,6355]
	7	[1,7,20,109,313,826,1881,3411,5424,7408,6423]
18	9	[14,76,279,826,2009,3987,6918,10737,9952]
	8	[5,20,68,296,763,1909,4062,6975,10870,10152]
19	9	[5,55,227,742,1906,4457,8521,14141,14307]
	8	[1,17,59,221,729,1837,4293,8595,14392,14346]
20	9	[2,33,167,657,1748,4515,9756,17717,18455]
	9	[9,55,162,619,1782,4327,9516,17893,18755]
21(1)	10	[23,101,555,1571,4322,10294,20864,22626]
	9	[6,30,149,500,1594,4218,9980,20750,22497]
22	10	[9,83,373,1432,3905,10406,22831,25937]
	9	[4,18,113,405,1368,3988,9964,22480,25739]
23(1)	10	[6,49,268,1130,3594,9814,23753,28051]
	9	[2,12,82,312,1157,3573,9614,23262,27407]
24	11	[33,195,868,3019,9077,23460,28750]
	10	[10,59,231,915,3146,8975,22977,28061]
25	11	[19,138,586,2554,7992,22260,28029]
	10	[6,36,178,738,2587,8077,22041,27489]
26	11	[9,92,429,1941,6868,20327,26326]
	10	[5,18,130,579,2095,7038,20343,26091]
27(1)	11	[5,54,312,1431,5628,18047,23611]
	10	[2,15,81,437,1698,5899,18256,23833]
28	11	[2,32,216,1042,4449,15279,20929]
	11	[14,52,315,1289,4857,16048,21002]
29	12	[22,142,742,3328,12763,17358]
	11	[8,39,223,960,3849,13707,18260]
30	12	[6,106,512,2499,10063,14409]
	11	[4,25,156,731,2989,11250,15491]
31	12	[3,59,346,1880,7765,11235]
	11	[3,13,109,533,2319,8912,12831]

Figure 52 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=14, d_{free}=17, (65231,43677) code. (Continued . . .)

32	12	[2,44,207,1303,5969,8721]
	11	[2,7,72,378,1777,6980,10117]
33	12	[1,21,152,898,4362,6627]
	11	[1,4,44,263,1316,5466,7823]
34	12	[1,11,91,643,3117,4818]
	11	[1,2,30,172,936,4204,6105]
35	12	[1,3,62,414,2258,3423]
	11	[1,2,22,106,659,3153,4620]
36	12	[1,3,28,278,1594,2423]
	12	[3,15,75,438,2295,3489]
37	12	[1,0,21,186,1029,1796]
	12	[1,13,51,305,1625,2502]
38	13	[2,10,108,742,1080]
	13	[7,40,230,1094,1817]
39	13	[1,6,61,491,798]
	13	[3,26,170,784,1207
40	13	[1,3,46,293,529]
	13	[1,15,103,603,848]
41	14	[3,26,185,336]
	14	[9,71,406,655]
42	14	[1,22,109,204]
	14	[4,45,274,451]
43	15	[11,81,117]
	14	[2,31,174,303]
44	15	[2,48,104]
	14	[1,14,110,218]
45	15	[2,24,50]
	14	[1,5,69,125]
46	15	[1,15,23]
	14	[1,1,40,77]
47	15	[1,8,15]
	14	[1,1,24,35]
48	16	[4,12]
	15	[2,14,24]
49	16	[2,4]
	15	[1,8,17]
50	16	[2]
	16	[7,6]
51	16	[2]
	16	[4,6]
52	16	[1,2]
	16	[1,6]

Figure 52 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=14, d_{free}=17, (65231,43677) code. (Continued . . .)

53	16	[1]
	16	[1]
54	17	[2]
	17	[2]

Figure 52 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=14, d_{free}=17, (65231,43677) code.

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3	3	[1,2,1]
	3	[1,2,1]
4	4	[3,3,1,1]
	4	[3,3,1,1]
5	4	[2,3,6,4,0,1]
	4	[1,6,4,2,3]
6	5	[6,6,8,8,2,2]
	5	[5,9,6,6,5,1]
7	5	[3,9,13,15,13,7,3,1]
	5	[2,11,14,11,14,9,2,1]
8	6	[11,18,18,30,28,14,6,2,1]
	5	[1,7,21,23,23,29,15,5,4]
9	6	[6,18,35,42,50,54,28,14,8,0,1]
	5	[1,3,19,38,40,52,52,26,15,9,1]
10	6	[1,21,36,58,90,98,96,60,29,17,4,2]
	6	[3,15,36,68,90,90,92,68,27,15,8]
11	7	[12,42,73,116,173,196,170,120,70,34,13,4]
	6	[2,9,35,81,125,170,190,162,124,77,31,13,5]
12	7	[5,36,84,147,240,333,373,318,237,158,70,30]
	6	[2,5,25,84,162,249,329,352,318,247,155,76,27]
13	8	[29,83,164,305,489,653,688,615,479,309,157]
	7	[8,16,62,190,334,482,616,684,644,468,302,166]
14	8	[12,80,171,351,644,958,1265,1305,1174,980,532]
	7	[4,15,54,166,377,677,968,1184,1319,1225,926,551]
15	8	[6,53,168,386,773,1288,1891,2422,2537,2294,1567]
	7	[3,10,41,150,383,790,1355,1910,2313,2506,2369,1548]
16(1)	8	[5,27,141,393,857,1614,2596,3770,4638,4844,3635]
	7	[1,6,38,127,350,840,1658,2740,3760,4468,4846,3651]

Figure 53 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=15, d_{free}=18, (123741,155027) code. (Continued . . .)

17(1)	8	[3,16,103,356,883,1844,3373,5308,7318,8980,7172]
	7	[1,3,25,108,317,831,1852,3444,5450,7370,8758,7084]
18(1)	8	[2,12,59,306,846,1962,3989,6946,10716,14360,12668]
	8	[5,16,71,277,802,1940,3973,7040,10858,14524,12467]
19	8	[1,8,46,208,750,2026,4370,8371,14341,21393,19710]
	8	[1,18,50,207,746,1885,4297,8554,14376,21584,20104]
20	9	[5,32,155,623,1831,4572,9643,17654,29279,28531]
	9	[11,43,162,611,1780,4409,9539,17848,29458,28805]
21(1)	9	[2,24,107,480,1624,448,10265,20735,32759,37947]
	9	[7,29,127,502,1578,4267,10078,20700,37365,38294]
22(1)	10	[16,80,360,1314,4136,10430,22747,44514,47693]
	9	[3,21,93,414,1355,3892,10129,22594,44426,47705]
23	10	[8,56,271,1039,3609,9932,23931,50348,55607]
	9	[2,14,67,316,1102,3532,9760,23209,49822,55871]
24	10	[3,37,209,775,3023,9075,23765,54084,62124]
	9	[2,10,42,234,906,3017,8950,23170,53109,61173]
25(2)	10	[2,23,133,640,2318,8092,22372,55184,66271]
	9	[1,9,28,165,710,2513,7963,22109,54136,64640]
26(1)	10	[1,13,93,463,1855,6689,20499,53924,66384]
	9	[1,4,27,105,547,2066,6807,20260,53143,65321]
27(1)	10	[1,8,63,308,1461,5449,17823,50769,64292]
	10	[4,22,76,380,1623,5782,18043,50071,63348]
28	10	[1,2,36,250,1038,4367,15063,45852,59848]
	10	[2,20,60,251,1260,4670,15613,46208,58735]
29(1)	10	[1,0,20,168,795,3328,12413,40121,53513]
	11	[14,53,189,918,3681,13141,41164,53828]
30	11	[2,9,107,574,2539,9930,34109,46403]
	11	[10,37,146,687,2860,10675,35643,47643]
31	11	[1,8,64,,390,1910,7733,28342,39049]
	11	[6,27,115,515,2166,8558,29922,41002]
32	12	[6,47,246,1364,6030,22844,32158]
	11	[1,19,93,379,1679,6694,24638,34082]
33	12	[1,38,155,984,4450,18137,25932]
	11	[1,8,71,284,1278,5229,19748,28125]
34	13	[19,120,669,3258,14112,20222]
	12	[6,47,200,961,4111,15684,22303]
35	13	[8,79,457,2393,10682,15606]
	12	[3,33,154,664,3127,12600,17494]
36	13	[2,60,292,1678,7992,11892]
	12	[2,19,113,494,2305,9798,14110]
37	13	[1,31,201,1202,5781,8815]
	12	[2,10,72,391,1677,7440,10989]

Figure 53 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=15, d_{free}=18, (123741,155027) code. (Continued . . .)

38	14	[21,125,813,4220,6350]
	13	[9,50,268,1258,5549,8386]
39	14	[13,70,568,2956,4649]
	13	[3,33,186,936,4180,6133]
40	14	[5,49,348,2139,3165]
	13	[1,22,128,648,3173,4596]
41	14	[4,27,235,1407,2357]
	13	[1,12,85,462,2277,3546]
42	14	[1,21,139,979,1484]
	13	[1,6,55,319,1638,2529]
43	15	[9,100,627,1058]
	13	[1,3,33,231,1134,1826]
44	15	[3,68,403,686]
	13	[1,1,20,154,812,1247]
45	15	[2,43,261,437]
	14	[2,12,97,552,925]
46	16	[19,192,265]
	14	[1,4,70,379,591]
47	16	[10,107,216]
	15	[3,40,255,428]
48	16	[6,67,102]
	15	[1,28,160,280]
49	16	[4,30,86]
	15	[1,15,112,165]
50	17	[24,28]
	15	[1,5,72,127]
51	17	[15,18]
	15	[1,3,38,81]
52	17	[2,26]
	16	[2,21,46]
53	18	[4]
	16	[1,12,23]
54		[]
	16	[1,5,15]
55		[]
	17	[4,6]
56		[]
	17	[1,6]
57		[]
	17	[1]

Figure 53 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=15, d_{free}=18, (123741,155027) code. (Continued . . .)

58		[]
	17	[1]
59		[]
	18	[2]

Figure 53 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=15, d_{free}=18, (123741,155027) code.

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3	3	[1,2,1]
	3	[1,2,1]
4	4	[3,3,1,1]
	4	[3,3,1,1]
5	4	[2,3,6,4,0,1]
	4	[2,3,6,4,0,1]
6	5	[6,6,8,8,2,2]
	5	[6,6,8,8,2,2]
7	5	[3,9,13,15,13,7,3,1]
	5	[3,9,13,15,13,7,3,1]
8	6	[11,18,18,30,28,14,6,2,1]
	6	[11,18,18,30,28,14,6,2,1]
9	6	[6,18,35,42,50,54,28,14,8,0,1]
	6	[6,18,35,42,50,54,28,14,8,0,1]
10	6	[1,21,36,58,90,98,96,60,29,17,4,2]
	6	[1,21,36,58,90,98,96,60,29,17,4,2]
11	7	[12,42,73,116,173,196,170,120,70,34,13,4,1]
	6	[1,11,37,78,126,163,186,180,125,65,33,14,4,1]
12	7	[5,36,84,147,240,333,373,318,237,158,70,31,13]
	6	[1,3,37,83,141,259,329,347,339,241,143,81,31,8]
13	8	[29,83,164,305,489,653,688,615,479,309,172,63]
	6	[1,3,19,76,185,310,483,644,667,636,497,292,171,69]
14	8	[12,80,171,351,644,958,1265,1305,1174,980,621,322]
	7	[2,20,46,178,403,628,941,1218,1339,1228,925,630,326]
15	8	[6,51,175,387,744,1309,1934,2371,2512,2339,1880,1101]
	7	[1,11,50,130,419,810,1265,1908,2333,2556,2397,1812,1111]
16	8	[3,28,154,390,816,1619,2667,3763,4581,4839,4571,3059]
	8	[8,37,114,366,906,1649,2589,3713,4609,4911,4557,3012]

Figure 54 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=16, d_{free}=19, (347433,251341) code. (Continued . . .)

17(1)	9	[18,114,363,849,1831,3378,5350,7430,8810,9390,7086]
	8	[2,29,107,305,854,1956,3386,5206,7418,8912,9392,7082]
18	9	[7,80,307,834,1944,3939,6995,10780,14446,17200,13871]
	8	[1,16,81,291,768,1950,4153,6942,10542,14584,17266,13815]
19	9	[4,45,239,766,1957,4324,8407,14393,21477,28374,24508]
	9	[9,59,237,709,1882,4428,8595,14260,21335,28530,24478]
20(1)	9	[2,28,159,659,1854,4482,9577,17690,29307,42989,39013]
	9	[2,41,191,625,1733,4437,9737,17918,29196,42797,39101]
21	10	[15,119,496,1649,4463,10129,20680,37290,59460,57679]
	10	[27,134,517,1573,4321,10222,20696,37414,59836,57175]
22	10	[4,88,359,1379,4140,10346,22752,44224,77454,78213]
	10	[15,84,431,1350,3969,10289,22629,44610,77746,7833]
23	10	[1,47,279,1092,3618,9980,23773,50170,94297,99425]
	10	[5,65,292,1183,3524,9721,23689,50051,94868,99910]
24(1)	10	[1,26,181,842,3074,9089,23758,54004,108624,119945]
	10	[1,40,215,910,3118,8954,23219,53678,109538,119572]
25(1)	10	[1,15,114,606,2480,8074,22444,55315,120268,135530]
	10	[1,21,149,681,2573,8056,22209,54478,119837,136682]
26(1)	10	[1,10,62,439,1911,6777,20538,54232,126746,147618]
	11	[12,100,488,2055,6938,20447,53474,125510,147056]
27	10	[1,7,39,284,1414,5543,18084,50816,127815,154302]
	11	[9,62,337,1525,5916,18093,50484,126880,151850]
28(1)	11	[8,24,174,1013,4382,15244,46114,124050,153078]
	11	[4,37,248,1124,4632,15753,46287,122958,152127]
29	11	[5,21,110,685,3305,12519,40437,115850,147053]
	11	[3,22,152,842,3596,13069,41027,115702,146376]
30(2)	11	[5,8,78,494,2362,9856,34502,104621,135945]
	11	[3,11,100,589,2702,10579,35269,105620,136072]
31	11	[1,12,44,333,1732,7560,28158,91724,122117]
	11	[2,6,65,393,2029,8232,29607,93292,123341]
32	11	[1,5,40,212,1217,5671,22496,77866,105748]
	11	[1,5,34,281,1437,6316,24060,80283,108294]
33(1)	12	[3,29,158,805,4142,17658,64112,89198]
	11	[1,4,22,166,1012,4843,18953,67266,92488]
34	12	[2,19,114,564,2924,13344,51922,72893]
	12	[4,14,97,711,3538,14729,55050,76788]
35	12	[2,11,77,401,2114,9769,40765,58819]
	12	[1,13,61,474,2514,11222,44047,62475]
36	13	[9,53,265,1528,7233,31044,45823]
	12	[1,5,42,315,1771,8e351,34465,49701]
37	13	[5,35,188,1074,5202,23615,34629]
	13	[7,21,203,1183,6207,26543,38345]

Figure 54 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=16, d_{free}=19, (347433,251341) code. (Continued . . .)

38	13	[3,20,129,773,3747,17417,26443]
	13	[3,16,127,816,4347,20155,29563]
39	14	[19,81,503,2745,12942,19078]
	13	[2,11,77,550,3060,14796,22369]
40	14	[10,52,368,1842,9571,14260]
	13	[1,6,56,350,2112,10756,16311]
41	14	[5,34,244,1316,6841,10428]
	13	[1,1,41,226,1470,7614,11820]
42	14	[3,21,149,950,4800,7563]
	13	[1,0,23,167,971,5345,8421]
43	14	[3,9,94,648,3452,5205]
	14	[2,10,101,697,3684,5847]
44	14	[2,5,55,437,2419,3756]
	14	[1,6,60,464,2557,4080]
45	14	[1,3,35,272,1733,2533]
	15	[5,37,295,1761,2808]
46	15	[3,24,168,1121,1941]
	15	[1,26,179,1232,1854]
47	15	[2,11,110,749,1200]
	16	[15,118,825,1280]
48	16	[9,70,481,812]
	16	[7,76,558,840]
49	16	[4,44,322,504]
	16	[1,55,323,647]
50	16	[3,22,223,320]
	17	[35,206,355]
51	16	[1,14,132,242]
	17	[15,143,221]
52	17	[10,84,128]
	17	[9,88,143]
53	17	[5,59,75]
	17	[6,45,104]
54	17	[2,38,56]
	17	[6,25,46]
55	18	[22,40]
	17	[3,17,31]
56	18	[14,16]
	17	[2,10,20]
57	18	[8,12]
	17	[1,8,9]
58	18	[3,10]
	17	[1,4,9]

Figure 54 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=16, d_{free}=19, (347433,251341) code. (Continued . . .)

59	19 17	[6] [1,2,5]
60	 18	[] [4]
61	 18	[] [1,6]
62	 19	[] [2]

Figure 54 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=16, d_{free}=19, (347433,251341) code.

1	2 2	[1] [1]
2	3 3	[2] [2]
3	3 3	[1,2,1] [1,2,1]
4	4 4	[3,3,1,1] [3,3,1,1]
5	4 4	[2,3,6,4,0,1] [2,3,6,4,0,1]
6	5 4	[6,6,8,8,2,2] [2,1,8,11,6,3,0,1]
7	5 5	[3,9,13,15,13,7,3,1] [5,4,15,18,11,8,1,2]
8	6 5	[11,18,18,30,28,14,6,2,1] [2,8,15,23,31,27,13,5,3,1]
9	6 5	[6,18,35,42,50,54,28,14,8,0,1] [1,7,13,33,50,50,50,30,13,7,1,1]
10	6 5	[1,21,36,58,90,98,96,60,29,17,4,2] [1,3,16,31,65,94,96,94,59,31,16,3,3]
11	7 5	[12,42,73,116,173,196,170,120,70,34,13,4,1] [1,3,9,30,79,129,167,196,167,117,30,9,7,1]
12	7 6	[5,36,84,147,240,333,373,318,237,158,70,31,14,1] [3,10,20,78,165,240,334,364,317,250,152,70,27,12,6]
13	8 6	[29,83,164,305,489,653,688,615,479,309,172,71,27] [2,7,20,70,169,309,502,656,667,609,504,318,151,67]
14	8 6	[12,80,171,351,644,958,1265,1305,1174,980,621,353,169] [2,4,18,57,166,362,637,999,1232,1284,1219,951,646,362,124]

Figure 55 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=17, d_{free}=20, (506477,673711) code. (Continued . . .)

15	8	[6,51,175,387,744,1309,1934,2371,2512,2339,1880,1281,659]
	6	[1,4,13,52,147,369,774,1317,1920,2381,2528,2321,1860,1331,685]
16	8	[3,28,154,390,816,1619,2667,3763,4581,4839,4571,3707,2192]
	6	[1,2,13,37,134,362,813,1642,2662,3730,4650,4884,4464,3706,2287]
17	9	[18,114,363,849,1831,3378,5350,7430,8810,9390,8956,5917]
	6	[1,0,12,30,115,334,817,1835,3367,5352,7416,8920,9454,8756,5930]
18	9	[4,45,239,766,1957,4324,8407,14393,21477,28374,33646,26970]
	6	[1,0,6,28,101,290,794,1892,3934,6993,10693,14616,17378,18144,13581]
19(1)	9	[4,45,239,766,1957,4324,8407,14393,21477,28374,24508]
	6	[1,0,6,13,96,248,732,1913,4176,8441,14390,21387,28629,33820,26818]
20	9	[2,28,159,659,1854,4482,9577,17690,29307,42989,55855,47820]
	6	[1,0,3,14,70,212,699,1769,4313,9484,17635,29265,43078,56200,47937]
21(1)	10	[15,119,496,1649,4463,10129,20680,37290,59460,85578,77426]
	6	[1,0,3,9,58,165,632,1660,4247,9970,20424,37113,59495,85911,77706]
22(1)	10	[11,61,390,1381,4117,10358,22649,44555,77266,120654,115659]
	7	[2,1,9,27,174,465,1582,4101,10018,22417,43913,77089,120800,115870]
23	10	[5,39,280,1075,3659,10013,23658,50151,94541,160029,158939]
	7	[1,2,8,21,116,433,1331,3855,9947,23203,49391,93850,159194,159440]
24	10	[3,23,181,829,3125,9032,23706,54043,108836,199937,207087]
	7	[1,1,9,14,95,332,1157,3480,9503,23405,52812,108276,197954,205938]
25	10	[1,16,112,622,2420,8203,22279,55196,120773,235100,254909]
	8	[3,5,13,72,262,956,3076,8807,22878,54655,118845,233324,252127]
26(1)	11	[11,70,418,1936,6837,20367,54111,126985,265580,295526]
	8	[2,3,17,53,203,772,2640,7923,21850,54702,125199,262848,293127]
27(1)	11	[6,44,292,1393,5619,17957,50763,127940,286783,328994]
	8	[2,1,12,45,177,603,2244,6911,20121,53373,127714,284163,326102]
28(1)	11	[1,36,181,1024,4314,15325,46299,123339,296845,351004]
	8	[1,2,10,35,132,517,1783,6016,18074,50387,127307,296205,348173]
29(1)	11	[1,16,140,671,3340,12453,40556,115777,294714,358737]
	9	[3,6,30,104,405,1482,4990,16008,46413,122973,300543,359767]
30	11	[1,8,88,482,2420,9837,34466,104864,283094,352673]
	9	[1,8,17,95,317,1166,4270,13580,41768,116362,295771,362221]
31(2)	12	[5,55,336,1726,7527,28455,91754,263256,336076]
	10	[7,17,72,247,953,3456,11608,36645,106736,285262,353746]
32	12	[3,32,224,1217,5703,22588,78014,237637,309280]
	10	[1,20,56,196,756,2804,9810,31504,96033,267734,338222]
33(2)	13	[19,149,847,4175,17721,64358,207663,277400]
	11	[12,47,163,591,2298,8038,27148,84050,245521,316490]
34(1)	13	[11,92,570,3052,13345,52204,177083,239438]
	11	[8,29,140,479,1839,6625,22693,73227,220273,287784]
35	13	[6,50,381,2181,10079,40716,147331,203711]
	11	[4,24,97,396,1469,5396,19045,62312,194659,257286]

Figure 55 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=17, d_{free}=20, (506477,673711) code. (Continued . . .)

36	13	[3,37,239,1459,7463,31505,119493,167577]
	11	[1,15,79,292,1201,4329,15792,52776,168919,226254]
37	13	[1,24,153,1000,5233,24180,94737,135292]
	12	[8,60,219,916,3587,12870,44030,145391,195336]
38	13	[1,7,113,662,3677,17869,74140,106784]
	12	[5,34,184,698,2829,10430,36684,123382,167100]
39	14	[5,64,439,2579,12924,56860,82920]
	12	[2,17,146,524,2206,8425,30188,103660,141522]
40	14	[2,43,280,1749,9295,42539,63471]
	13	[10,97,410,1697,6624,24757,86377,118307]
41	14	[1,26,171,1197,6525,31509,47047]
	13	[7,52,323,1284,5199,19896,71477,98290]
42	15	[14,117,774,4566,22810,34857]
	13	[6,27,232,971,4099,15617,58491,81243]
43	15	[5,77,497,3171,16328,25032]
	13	[3,17,155,733,3097,12398,47066,66088]
44	15	[2,40,339,2139,11542,17919]
	13	[2,11,92,527,2374,9744,37174,53610]
45	15	[1,19,193,1482,8034,12627]
	13	[2,5,63,361,1779,7482,29467,42134]
46	16	[13,123,918,5553,8899]
	13	[1,3,33,273,1222,5731,23187,33095]
47	16	[4,79,593,3700,6105]
	13	[1,2,24,164,911,4180,18017,25990]
48	16	[3,40,393,2420,4084]
	14	[3,12,109,602,3131,13643,20085]
49	16	[3,17,240,1642,2589]
	14	[2,9,66,419,2281,10141,15251]
50	16	[1,11,135,1074,1768]
	14	[1,5,44,290,1546,7592,11323]
51	16	[1,6,74,715,1081]
	15	[6,32,184,1085,5525,8285]
52	17	[4,46,425,766]
	15	[2,20,133,706,4007,6034]
53	17	[2,20,283,424]
	16	[16,79,501,2738,4441]
54	18	[16,156,298]
	16	[9,57,338,1875,3045]
55	18	[9,89,171]
	16	[6,37,232,1348,1946]
56	18	[4,54,94]
	16	[4,26,143,931,1479]

Figure 55 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=17, d_{free}=20, (506477,673711) code. (Continued . . .)

57	18	[3,29,57]
	16	[2,14,113,615,987]
58	18	[1,21,25]
	17	[10,64,441,668]
59	19	[17,12]
	17	[3,43,282,493]
60	19	[9,16]
	17	[2,30,179,298]
61	19	[5,8]
	17	[2,17,124,183]
62	19	[3,4]
	18	[12,74,144]
63	19	[2,2]
	18	[4,48,88]
64	19	[2]
	18	[3,24,55]
65	19	[1,2]
	18	[1,22,13]
66	20	[2]
	18	[1,9,27]
67		[]
	18	[1,5,9]
68		[]
	19	[4,6]
69		[]
	19	[2.4]
70		[]
	19	[1,2]
71		[]
	20	[2]

Figure 55 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=17, d_{free}=20, (506477,673711) code.

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3	3	[1,2,1]
	3	[1,2,1]

Figure 56 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=18, d_{free}=21, (1352755,1771563) code. (Continued . . .)

4	4	[3,3,1,1]
	4	[3,3,1,1]
5	4	[2,3,6,4,0,1]
	4	[1,6,4,2,3]
6	5	[6,6,8,8,2,2]
	5	[5,9,6,6,5,1]
7	5	[3,9,13,15,13,7,3,1]
	5	[2,11,14,11,14,9,2,1]
8	6	[11,18,18,30,28,14,6,2,1]
	5	[1,7,21,23,23,29,15,5,4]
9	6	[6,18,35,42,50,54,28,14,8,0,1]
	5	[1,3,19,38,40,52,52,26,15,9,1]
10	6	[1,21,36,58,90,98,96,60,29,17,4,2]
	6	[3,15,36,68,90,90,92,68,27,15,8]
11	7	[12,42,73,116,173,196,170,120,70,34,13,4,1]
	6	[1,12,34,74,137,168,172,180,131,60,34,18,3]
12	7	[5,36,84,147,240,333,373,318,237,158,70,31,14,1,1]
	6	[1,7,26,79,166,252,321,350,325,255,148,67,36,14,1]
13	8	[29,83,164,305,489,653,688,615,479,309,172,71,27,10]
	6	[1,4,20,67,176,342,488,609,686,632,484,309,160,78,32,7]
14	8	[12,80,171,351,644,958,1265,1305,1174,980,621,353,184,55]
	6	[1,3,11,60,168,367,681,978,1188,1295,1213,968,636,345,175,70]
15	8	[6,53,168,386,773,1288,1891,2422,2537,2294,1875,1294,759,359]
	6	[1,2,9,41,149,389,781,1353,1939,2301,2475,2375,1895,1279,751,352]
16	8	[1,38,139,382,856,1606,2644,3722,4634,4946,4426,3670,2688,1348]
	7	[3,6,32,118,361,873,1633,2701,3795,4481,4829,4581,3683,2619,1390]
17	9	[18,118,348,854,1863,3372,5308,7364,8940,9480,8740,7232,4535]
	7	[1,6,24,99,313,838,1888,3432,5370,7424,8832,9286,8834,7328,4452]
18	9	[11,72,299,842,1964,3989,6913,10652,14582,17352,18250,17120,11621]
	7	[1,3,18,76,278,784,1881,4051,7166,10722,14456,17228,18120,17196,11706]
19	9	[7,42,233,750,1969,4427,8367,14213,21478,28536,33818,35432,26244]
	7	[1,1,14,57,222,729,1827,4262,8688,14547,21416,28494,33520,35286,26340]
20	9	[4,29,156,626,1872,4556,9573,17687,29131,42888,56156,65784,52396]
	8	[3,9,33,191,619,1703,4393,9539,17946,29716,42994,55774,65518,52096]
21(1)	9	[3,16,110,489,1616,4485,10343,20590,36967,59595,85575,110335,93866]
	8	[1,8,27,132,526,1564,4183,10015,20747,37596,60128,85697,110116,93388]
22	9	[1,15,70,347,1347,4172,10476,22697,44377,77146,120522,170950,152983]
	8	[1,2,24,108,394,1365,3944,9961,22483,44529,77928,122035,171024,152284]
23	9	[1,9,44,267,1035,3586,10182,23847,50065,94327,159592,244807,230865]
	9	[3,13,77,325,1139,3532,9551,23139,49907,94836,160849,246386,232572]
24(1)	10	[7,29,180,831,2917,9213,23950,53819,109359,199105,328888,324959]
	9	[2,7,53,261,916,3051,8919,22866,52838,108886,200332,331542,326464]

Figure 56 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=18, d_{free}=21, (1352755,1771563) code. (Continued . . .)

25(3)	10	[5,24,110,618,2343,7955,22875,55294,120172,235863,418508,428638]
	9	[1,6,35,187,740,2549,8001,21977,53672,118501,235507,420827,431650]
26	10	[1,21,79,429,1845,6632,20621,54354,126779,266205,504875,536267]
	10	[7,18,136,578,2083,6960,20239,52843,123936,262863,505454,538476]
27	11	[13,60,301,1393,5396,17837,51088,128125,286890,582415,637598]
	10	[4,17,88,423,1702,5867,18066,50200,124955,281654,577789,636639]
28(2)	11	[10,32,230,1027,4193,15109,46026,124005,297331,641912,725936]
	10	[1,15,62,310,1311,4816,15816,46149,121701,290718,632649,719512]
29	11	[5,21,156,778,3240,12266,40145,115355,295905,681132,789333]
	10	[1,9,49,223,980,3833,13448,41415,114840,290138,667462,778532]
30(3)	11	[2,15,104,555,2475,9789,33913,103898,283509,694034,829221]
	10	[1,3,33,186,707,3005,11057,36089,105736,280191,681469,812702]
31	11	[1,10,66,390,1835,7702,27981,90452,262947,682810,835074]
	11	[3,21,128,556,2273,8916,30682,94347,263990,673994,821004]
32	12	[7,40,266,1372,5840,22568,77218,235744,649503,814572]
	11	[1,16,88,401,1778,7000,25289,82469,241969,648009,805329]
33(3)	12	[2,27,183,976,4409,17806,64036,206587,599347,766546]
	11	[1,7,59,305,1348,5445,20465,70189,216130,607036,768985]
34	12	[2,15,117,686,3253,13865,52014,176061,538386,702791]
	11	[1,4,34,222,1016,4189,16375,58268,188544,554786,714902]
35	12	[1,9,80,460,2338,10614,41512,146819,471162,626818]
	12	[6,19,139,754,3245,12854,47598,160794,494642,649763]
36	12	[1,4,45,332,1664,7851,32528,120370,403054,544467]
	12	[4,15,91,519,2477,10031,38062,134720,432356,574063]
37	13	[4,32,187,1224,5766,24849,96809,337905,463492]
	12	[2,13,61,345,1848,7705,30208,110806,369678,499537]
38	13	[2,22,119,816,4258,18754,75853,278570,386336]
	12	[2,8,40,242,1313,5860,23751,89610,310373,425322]
39	13	[2,9,90,538,3021,13971,58654,224901,316367]
	13	[9,28,167,914,4299,18504,71524,256735,354819]
40	13	[1,5,55,383,2046,10274,45016,177764,254396]
	13	[3,25,124,610,3183,14006,56318,209065,292884]
41	14	[5,31,268,1387,7413,33752,138839,200794]
	13	[1,16,81,447,2295,10443,43807,167883,237068]
42	14	[2,22,154,1000,5203,25116,106797,155534]
	14	[10,62,294,1640,7792,33373,133121,189687]
43	14	[1,13,107,650,3663,18250,81313,119089]
	14	[3,47,208,1156,5678,25220,103806,150065]
44	15	[6,71,419,2566,13206,60512,90575]
	14	[1,25,158,812,4051,18930,80162,115985]
45	15	[3,38,285,1761,9377,44658,67213]
	15	[17,97,588,2922,13824,61218,89503]

Figure 56 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=18, d_{free}=21, (1352755,1771563) code. (Continued . . .)

46	15	[1,22,184,1183,6614,32528,49397]
	15	[5,74,400,2089,10124,45802,68331]
47	15	[1,9,115,788,4592,23461,35828]
	15	[3,41,276,1506,7282,34093,50931]
48	15	[1,1,72,516,3172,16662,25763]
	15	[3,25,170,1062,5298,25087,37667]
49	15	[1,0,37,342,2095,11795,18271]
	15	[2,12,116,724,3768,18404,27710]
50	16	[2,17,203,1405,8193,12820]
	15	[2,9,74,491,2621,13353,20325]
51	16	[1,10,114,900,5620,8928]
	15	[1,5,53,321,1818,9566,14670]
52	16	[1,5,73,565,3759,6078]
	15	[1,4,31,220,1235,6807,10431]
53	16	[1,1,46,358,2474,4079]
	15	[1,0,24,139,863,4751,7400]
54	17	[2,25,230,1614,2646]
	15	[1,0,10,89,607,3335,5088]
55	17	[1,14,145,1032,1754]
	15	[1,0,7,54,373,2361,3625]
56	18	[9,83,686,1079]
	16	[2,3,37,237,1566,2588]
57	18	[6,46,446,704]
	16	[1,3,25,144,1057,1679]
58	18	[4,28,266,480]
	17	[4,14,108,669,1136]
59	18	[2,15,168,279]
	17	[2,12,68,448,728]
60	19	[13,98,173]
	17	[1,8,46,287,507]
61	19	[8,53,118]
	18	[7,33,174,339]
62	19	[2,39,54]
	18	[3,26,122,188]
63	19	[1,21,41]
	18	[2,17,84,139]
64	20	[10,26]
	19	[12,66,80]
65	20	[7,6]
	19	[7,46,67]
66	20	[5,4]
	19	[4,32,44]

Figure 56 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=18, d_{free}=21, (1352755,1771563) code. (Continued . . .)

67	20 19	[3,4] [2,18,38]
68	20 19	[1,4] [2,10,18]
69	20 19	[1] [1,7,11]
70	21 19	[2] [1,4,7]
71	 20	[] [5,2]
72	 20	[] [3,4]
73	 20	[] [2,2]
74	 20	[] [1,2]
75	 21	[] [2]

Figure 56 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=18, d_{free}=21, (1352755,1771563) code.

1	2 2	[1] [1]
2	3 3	[2] [2]
3	3 3	[1,2,1] [1,2,1]
4	4 4	[3,3,1,1] [3,3,1,1]
5	4 4	[2,3,6,4,0,1] [2,3,6,4,0,1]
6	5 5	[6,6,8,8,2,2] [6,6,8,8,2,2]
7	5 5	[3,9,13,15,13,7,3,1] [3,9,13,15,13,7,3,1]
8	6 6	[11,18,18,30,28,14,6,2,1] [11,18,18,30,28,14,6,2,1]
9	6 6	[6,18,35,42,50,54,28,14,8,0,1] [6,18,35,42,50,54,28,14,8,0,1]

Figure 57 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=19, d_{free}=22, (2451321,3546713) code. (Continued . . .)

10	6	[1,21,36,58,90,98,96,60,29,17,4,2]
	6	[5,9,41,72,79,98,90,64,35,13,5,0,1]
11	7	[12,42,73,116,173,196,170,120,70,34,13,4,1]
	6	[3,7,38,73,136,174,161,186,131,59,40,13,2,0,1]
12	7	[5,36,84,147,240,333,373,318,237,158,70,31,14,1,1]
	7	[11,22,85,153,256,337,324,346,251,136,85,29,10,1,2]
13	8	[29,83,164,305,489,653,688,615,479,309,172,71,27,11]
	7	[5,23,71,171,320,501,639,661,618,505,309,157,80,27,5,3]
14	8	[12,80,171,351,644,958,1265,1305,1174,980,621,353,184,62,23]
	7	[2,16,68,158,368,660,968,1254,1264,1180,1012,618,344,188,64,16]
15	8	[6,53,168,386,773,1288,1891,2422,2537,2294,1875,1294,759,392,149]
	7	[1,8,58,150,368,793,1312,1933,2386,2453,2332,1909,1288,763,384,157]
16	8	[1,38,139,382,856,1606,2644,3722,4634,4946,4426,3670,2688,1554,764]
	8	[6,38,136,357,852,1641,2635,3797,4615,4793,4503,3707,2639,1611,750]
17	9	[18,118,348,854,1863,3372,5308,7364,8940,9480,8740,7232,5326,2858]
	8	[1,31,103,340,848,1821,3446,5318,7384,9020,9268,8710,7374,5272,2906]
18	9	[7,82,303,826,1955,3963,7002,10700,14394,17372,18390,17072,14250 ,8943]
	9	[15,88,296,805,1896,3986,7090,10684,14498,17408,18088,17038,14452,8863]
19	9	[3,51,232,751,1983,4332,8401,14402,21391,28346,33844,35658,33290,22810]
	9	[6,65,239,726,1936,4291,8428,14448,21485,28586,33714,35172,33356,23068]
20(1)	10	[31,170,634,1870,4457,9553,17915,29135,42741,56096,65688,69344,51114]
	9	[3,39,183,646,1813,4413,9485,17847,29425,42865,56175,65808,68614,50854]
21	10	[13,121,509,1645,4401,10145,20796,37345,59344,85234,110433,128538,102040]
	9	[2,21,132,532,1629,4365,10041,20578,37454,59662,85529,110736,128191,101410]
22	10	[7,70,385,1415,4052,10275,22868,44470,77348,120745,170035,217327,183817]
	9	[1,15,79,425,1380,4096,10301,22331,44362,77697,121003,170904,217529,183448]
23(2)	10	[2,47,260,1130,3650,9848,23757,50313,94491,159914,244591,339057,302165]
	9	[1,7,63,273,1186,3629,9899,23686,49466,94225,160718,245393,339873,302977]
24(3)	10	[1,24,180,856,3082,9104,23567,53920,109334,199603,329645,493791,461499]
	9	[1,5,35,204,915,3093,9178,23689,53209,108362,199545,330362,495823,462403]
25(2)	10	[1,11,120,623,2434,8105,22575,54936,120163,236177,419358,676613,657879]
	9	[1,3,19,153,665,2559,8150,22571,54919,119082,234923,418994,677633,661358]
26(4)	10	[1,7,64,443,1934,6734,20586,54230,126160,265859,506125,874958,887060]
	10	[3,12,93,519,2006,6942,20727,54134,125686,263954,504374,874853,887115]
27(2)	11	[6,36,295,1439,5528,17986,51003,127798,286079,581676,1077194,1127599]
	10	[2,6,67,348,1567,5797,18287,51027,127325,285555,578984,1072194,1128150]
28(3)	11	[4,23,186,1025,4345,15318,46184,123691,296727,641036,1262439,1368565]
	10	[2,3,45,239,1144,4674,15777,46525,123859,296096,638176,1257562,1362427]
29(1)	11	[2,16,113,710,3342,12457,40447,116000,294981,678759,1421848,1581460]
	10	[1,4,22,177,819,3630,13091,41399,116395,294748,677879,1415250,1575287]
30(2)	11	[1,12,72,458,2474,9928,34292,104648,283847,692639,1536342,1761863]
	11	[4,15,111,599,2734,10544,35633,106329,284034,691952,1533758,1753063]

Figure 57 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=19, d_{free}=22, (2451321,3546713) code. (Continued . . .)

31(2)	11	[1,7,46,309,1756,7576,28298,91965,263443,682001,1603252,1882782]
	11	[3,8,76,422,2005,8334,29712,94072,266046,683062,1601922,1878358]
32(1)	12	[5,30,203,1217,5707,22574,78085,237834,650288,1615696,1943968]
	11	[1,10,42,292,1478,6317,24333,80837,241781,654865,1616564,1944245]
33(1)	12	[4,22,133,824,4084,17694,64637,208022,602498,1576857,1940092]
	11	[1,5,34,187,1075,4752,19089,68179,214008,609497,1583686,1944168]
34(2)	12	[3,9,91,586,2880,13427,52095,177034,541798,1495544,1877577]
	11	[1,3,28,115,761,3524,14804,55605,184585,553551,1507993,1887586]
35	13	[8,63,387,2025,9972,40950,147135,474171,1377814,1766775]
	12	[3,15,88,503,2630,11301,44174,155538,489480,1398845,1785581]
36	13	[5,34,258,1462,7237,31287,119443,405323,1236316,1614428]
	12	[2,9,67,352,1818,8547,34703,127564,422744,1266566,1642906]
37	13	[3,20,162,1026,5218,23469,94893,337709,1082343,1440312]
	12	[2,5,46,245,1300,6254,26726,103042,355866,1120132,1477874]
38	13	[1,16,101,678,3701,17525,73523,275260,926949,1250457]
	12	[1,4,32,158,933,4575,20209,81506,293940,967754,1298243]
39	14	[12,59,457,2600,12732,56164,219833,775637,1064642]
	13	[5,13,136,626,3219,15329,63049,238379,819863,1113083]
40	14	[8,41,285,1775,9218,42182,172580,635373,885599]
	13	[3,11,85,445,2314,11253,48344,189857,679989,939074]
41	14	[4,28,188,1186,6497,31435,132856,510736,722817]
	14	[13,58,302,1660,8114,36439,149312,553651,775175]
42	14	[3,13,123,816,4511,22842,101013,404135,576934]
	14	[5,40,228,1123,5987,26953,115331,444656,627589]
43	14	[3,7,77,529,3177,16331,75450,314304,455365]
	14	[3,23,146,852,4210,19942,87706,351331,501913]
44	15	[11,50,328,2132,11763,55396,240589,352686]
	14	[1,12,104,574,3075,14559,65644,274048,394544]
45	15	[6,41,205,1440,8127,40552,181752,267997]
	14	[1,4,65,411,2175,10559,48916,210004,306969]
46	15	[3,24,157,916,5631,29117,135727,201577]
	15	[4,43,251,1541,7631,36301,159108,234201]
47	16	[18,105,632,3795,20545,99969,150267]
	15	[2,27,174,991,5588,26469,119787,177079]
48	16	[12,65,420,2639,14340,72303,110454]
	15	[1,16,121,676,3803,19471,89172,132803]
49	16	[8,40,286,1771,10072,51612,79704]
	15	[1,10,66,492,2585,13975,65835,99001]
50	16	[3,36,173,1174,7002,36794,56530]
	15	[1,7,43,313,1816,9803,48249,72759]
51	16	[1,26,116,763,4867,25780,40464]
	16	[6,29,210,1223,6895,34943,52909]

Figure 57 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=19, d_{free}=22, (2451321,3546713) code. (Continued . . .)

52	17	[11,94,503,3260,18078,28322]
	16	[3,20,135,817,4833,24983,38297]
53	17	[6,49,355,2189,12615,19578]
	16	[1,14,81,561,3336,17627,27514]
54	17	[3,30,237,1449,8703,13699]
	16	[1,8,51,369,2305,12344,19375]
55	17	[2,18,150,975,5872,9523]
	16	[1,8,20,247,1578,8630,13485]
56	17	[1,11,97,634,4012,6333]
	16	[1,6,17,145,1057,5985,9457]
57	18	[8,60,417,2721,4267]
	17	[5,15,83,712,4076,6551]
58	18	[4,37,272,1839,2872]
	17	[2,12,55,457,2783,4439]
59	18	[2,21,168,1210,2002]
	18	[11,36,294,1866,3027]
60	18	[1,12,111,760,1328]
	18	[4,32,203,1197,2061]
61	18	[1,3,81,487,810]
	18	[1,24,126,864,1223]
62	18	[1,1,40,335,525]
	19	[15,85,554,961]
63	18	[1,1,19,216,346]
	19	[8,59,368,593]
64	19	[2,10,129,226]
	19	[4,36,245,406]
65	19	[1,8,78,126]
	19	[3,13,172,263]
66	20	[7,49,75]
	19	[2,8,113,156]
67	20	[5,29,53]
	19	[1,6,70,108]
68	20	[1,20,35]
	20	[6,38,76]
69	20	[1,11,19]
	20	[2,25,44]
70	21	[8,10]
	20	[1,12,31]
71	21	[4,8]
	20	[1,9,7]
72	21	[2,4]
	20	[1,6,7]

Figure 57 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=19, d_{free}=22, (2451321,3546713) code. (Continued . . .)

73	22	[4]
	21	[6,4]
74		[]
	21	[3,6]
75		[]
	22	[6]

Figure 57 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=19, d_{free}=22, (2451321,3546713) code.

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3	3	[1,2,1]
	3	[1,2,1]
4	4	[3,3,1,1]
	4	[3,3,1,1]
5	4	[2,3,6,4,0,1]
	4	[1,6,4,2,3]
6	5	[6,6,8,8,2,2]
	4	[1,3,8,10,5,3,2]
7	5	[3,9,13,15,13,7,3,1]
	4	[1,1,9,15,13,15,7,1,2]
8	6	[11,18,18,30,28,14,6,2,1]
	5	[3,4,18,28,24,28,14,4,5]
9	6	[6,18,35,42,50,54,28,14,8,0,1]
	5	[1,6,15,32,50,52,46,32,13,6,3]
10	6	[1,21,36,58,90,98,96,60,29,17,4,2]
	5	[1,2,17,34,58,100,98,84,69,26,13,10]
11	7	[12,42,73,116,173,196,170,120,70,34,13,4,1]
	5	[1,1,10,40,69,115,188,200,155,119,74,32,15;5]
12	7	[5,36,84,147,240,333,373,318,237,158,70,31,14,1,1]
	6	[2,7,30,81,145,242,347,370,316,235,148,77,33,12,3]
13	8	[29,83,164,305,489,653,688,615,479,309,172,71,27,11]
	6	[1,5,24,76,162,309,498,636,706,639,444,300,186,71,26,12,1]
14	8	[12,80,171,351,644,958,1265,1305,1174,980,621,353,184,62,23]
	6	[1,4,14,66,170,352,654,958,1220,1372,1210,894,630,376,170,66,27]
15	8	[6,51,175,387,744,1309,1934,2371,2512,2339,1880,1281,752,391,159]
	7	[3,14,46,158,387,752,1309,1906,2369,2600,2353,1794,1273,776,383,162]

Figure 58 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=20, d_{free}=22, (6567413,5322305) code. (Continued . . .)

16	8	[3,28,154,390,816,1619,2667,3763,4581,4839,4571,3707,2571,1593,763]
	7	[1,10,44,122,370,875,1577,2607,3779,4627,4973,4535,3569,2593,1611,761]
17	9	[18,114,363,849,1831,3378,5350,7430,8810,9390,8956,7208,5204,2929]
	8	[6,35,109,324,880,1841,3292,5332,7396,8938,9614,8828,7064,5198,2939]
18	9	[7,80,307,834,1944,3939,6995,10780,14446,17200,18338,17264,14240,8825]
	8	[5,22,85,288,836,1967,3912,6889,10630,14528,17558,18420,17108,14202,8638]
19	9	[3,49,235,762,1962,4337,8410,14316,21524,28498,33538,35516,33592,22922]
	8	[3,17,58,253,755,1924,4375,8356,14137,21350,28560,34078,35794,33372,22774]
20	10	[31,162,665,1838,4446,9634,17725,29248,42979,55846,65682,69236,51116]
	8	[2,13,43,189,667,1844,4498,9525,17573,28975,42747,56266,66230,69576,51212]
21	10	[13,121,507,1635,4439,10204,20615,37192,59722,85477,110088,128259,102104]
	9	[11,33,145,547,1673,4459,10139,20537,36950,58994,85346,110990,128962,102684]
22	10	[9,68,386,1351,4166,10430,22523,44387,77450,120925,170587,216904,183107]
	9	[5,31,106,424,1488,4172,10304,22688,44145,76643,120026,170424,218364,184194]
23	10	[6,43,253,1109,3615,10117,23719,49850,94590,159787,245159,339779,301674]
	9	[1,23,90,320,1230,3829,9994,23661,50132,93810,158397,243735,339839,303342]
24	10	[3,25,171,854,3054,9133,23698,54015,109130,198763,329973,495362,461723]
	9	[1,15,60,262,998,3280,9435,23774,53773,108813,197878,327418,493040,461252]
25	11	[17,121,597,2449,8074,22599,55136,120250,235914,418210,676811,660595]
	9	[1,13,38,190,802,2748,8532,23002,55298,120154,234623,415718,672986,657095]
26	11	[7,75,435,1929,6709,20521,54277,126702,265907,504634,874844,885925]
	10	[6,37,136,609,2299,7387,21379,54908,126947,265192,502180,869868,880869]
27	11	[4,46,303,1371,5581,18065,50709,127830,287481,581219,1073740,1129087]
	10	[4,24,103,471,1799,6336,19261,52291,129326,287200,579310,1069889,1120881]
28	11	[2,28,205,978,4352,15316,46126,123843,296774,641789,1261954,1364730]
	10	[1,22,71,345,1440,5126,16919,48813,126470,298708,641274,1258361,1360005]
29	11	[1,12,131,740,3240,12467,40562,115598,295289,680229,1421033,1581800]
	11	[13,58,246,1118,4171,14349,43861,120069,300781,683394,1418381,1579220]
30(1)	11	[1,6,78,512,2420,9811,34399,104672,283665,692620,1538235,1762297]
	11	[7,46,179,828,3353,11805,38467,111326,292026,702596,1542498,1760919]
31	11	[1,4,37,347,1774,7641,28042,91511,264236,682138,1603342,1884579]
	11	[4,32,137,607,2580,9731,32729,99755,276916,699350,1618732,1894643]
32	12	[4,20,226,1224,5804,22485,77661,237977,650414,1615926,1945093]
	11	[1,20,100,464,1983,7733,27338,87552,254619,676062,1647402,1968831]
33(1)	12	[1,14,129,876,4223,17717,63980,208029,602460,1576207,1942355]
	11	[1,8,75,346,1476,6113,22506,74844,228071,637013,1627841,1983942]
34	12	[1,11,66,591,3037,13538,51788,176821,541545,1493784,1878357]
	12	[6,44,256,1115,4698,18166,62934,200104,583909,1564882,1946871]
35	12	[1,7,31,384,2186,10013,41059,146751,473522,1377168,1764337]
	12	[4,23,177,867,3527,14363,52033,171885,524012,1466287,1856165]
36	13	[5,21,219,1527,7374,31630,119494,403645,1235712,1614373]
	12	[1,21,109,617,2720,11099,42251,145204,459663,1342888,1729006]

Figure 58 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=20, d_{free}=22, (6567413,5322305) code. (Continued . . .)

37	13	[4,13,125,1017,5335,23868,95060,337231,1081332,1437341]
	12	[1,10,84,404,2026,8692,33529,120313,395885,1203666,1573753]
38	13	[3,8,84,611,3813,17786,73770,275867,926070,1248796]
	12	[1,6,44,297,1493,6554,26395,98057,335460,1057196,1401821]
39	13	[1,7,53,401,2515,13065,56696,220353,775597,1064580]
	12	[1,5,22,213,1057,4842,20669,78703,278623,913033,1225674]
40	13	[1,4,34,260,1686,9248,42603,173268,637085,885256]
	13	[3,19,128,729,3648,15671,62480,228289,774364,1052590]
41	13	[1,3,23,156,1116,6456,31554,133577,513214,723718]
	13	[2,13,84,496,2652,11780,48703,184558,646788,888355]
42	13	[1,2,15,98,726,4418,22879,101703,405373,580477]
	13	[2,5,65,327,1850,8862,37393,146898,532169,739270]
43	13	[1,0,12,64,441,3075,16199,75834,315964,456071]
	14	[8,38,216,1312,6421,28398,115674,431306,605543]
44	14	[2,7,40,302,1978,11374,55957,241271,354457]
	14	[3,32,143,910,4609,21231,89427,345334,489774]
45	14	[1,6,29,183,1352,7765,40292,182339,269336]
	14	[2,20,103,612,3295,15709,68162,272532,390514]
46	15	[6,20,114,918,5244,28679,135010,203035]
	14	[1,9,78,437,2258,11465,51444,212226,306811]
47	15	[2,20,73,586,3651,19959,98522,149959]
	15	[9,43,304,1578,8261,38355,163311,237712]
48	15	[1,14,48,386,2460,13911,70833,108909]
	15	[5,30,206,1108,5797,28386,124137,182268]
49	16	[7,42,246,1613,9675,50601,77610]
	15	[1,25,124,784,4083,20548,93561,138009]
50	16	[5,21,178,1034,6726,35473,55741]
	16	[16,85,532,2905,14678,69393,103916]
51	16	[2,16,115,703,4457,24963,38954]
	16	[9,54,375,1998,10521,50941,76527]
52	16	[2,6,79,476,2964,17228,27379]
	16	[3,44,244,1364,7445,37169,55968]
53	17	[8,38,343,1942,11850,18748]
	16	[2,24,164,968,5238,26575,41016]
54	17	[3,33,211,1298,8088,12813]
	17	[18,103,661,3665,19008,29208]
55	17	[1,25,131,867,5434,8804]
	17	[8,74,443,2537,13464,20917]
56	18	[15,88,566,3737,5733]
	17	[4,51,276,1802,9485,14647]
57	18	[5,70,372,2408,4149]
	18	[28,196,1182,6688,10436]

Figure 58 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=20, d_{free}=22, (6567413,5322305) code. (Continued . . .)

58	18	[3,35,266,1621,2569]
	18	[14,128,806,4559,7386]
59	18	[2,18,172,1095,1752]
	18	[7,79,542,3115,5015]
60	18	[2,7,107,746,1151]
	18	[4,42,368,2109,3418]
61	18	[1,6,53,501,788]
	18	[1,23,224,1432,2341]
62	18	[1,4,35,287,558]
	18	[1,13,133,935,1580]
63	19	[3,25,175,309]
	19	[10,70,631,976]
64	19	[1,16,114,188]
	19	[7,41,393,665]
65	19	[1,8,70,130]
	19	[1,34,224,438]
66	20	[6,45,70]
	19	[1,18,144,244]
67	20	[1,35,41]
	19	[1,10,90,152]
68	20	[1,19,33]
	20	[8,58,86]
69	20	[1,10,19]
	20	[7,34,59]
70	20	[1,6,9]
	20	[3,22,43]
71	21	[3,10]
	20	[1,13,27]
72	21	[1,4]
	20	[1,6,15]
73	22	[2]
	20	[1,3,7]
74		[]
	21	[4,2]
75		[]
	21	[3,2]
76		[]
	21	[1,4]
77		[]
	22	[2]

Figure 58 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=20, d_{free}=22, (6567413,5322305) code.

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3	3	[1,2,1]
	3	[1,2,1]
4	4	[3,3,1,1]
	3	[1,1,3,3]
5	4	[2,3,6,4,0,1]
	4	[2,4,4,4,2]
6	5	[6,6,8,8,2,2]
	4	[1,4,7,8,7,4,1]
7	5	[3,9,13,15,13,7,3,1]
	4	[1,2,8,14,14,14,8,2,1]
8	6	[11,18,18,30,28,14,6,2,1]
	5	[2,9,14,24,30,22,18,8,0,1]
9	6	[6,18,35,42,50,54,28,14,8,0,1]
	5	[1,5,22,28,38,62,48,28,17,5,2]
10	6	[1,21,36,58,90,98,96,60,29,17,4,2]
	6	[4,18,37,57,84,104,94,62,32,14,5,1]
11	7	[12,42,73,116,173,196,170,120,70,34,13,4,1]
	6	[1,16,37,70,126,160,186,188,125,64,33,14,4]
12	7	[5,36,84,147,240,333,373,318,237,158,70,31,14,1,1]
	7	[10,35,80,152,234,323,368,328,254,153,64,32,14,1]
13	8	[29,83,164,305,489,653,688,615,479,309,172,71,27,11,0,1]
	7	[5,28,78,175,313,464,626,699,631,500,314,149,75,32,6,1]
14	8	[12,80,171,351,644,958,1265,1305,1174,980,621,353,184,62,23,7,2]
	7	[2,20,72,170,376,652,900,1202,1376,1212,944,654,352,164,68,22,6]
15	8	[6,51,175,387,744,1309,1934,2371,2512,2339,1880,1281,752,391,170,57,17]
	7	[2,9,59,171,382,799,1294,1807,2362,2573,2356,1905,1290,757,386,149,60,22]
16	8	[3,28,154,390,816,1619,2667,3763,4581,4839,4571,3707,2571,1593,849,393,148]
	7	[1,6,41,150,382,877,1653,2557,3639,4605,4899,4573,3749,2615,1607,839,356,144]
17	9	[18,114,363,849,1831,3378,5350,7430,8810,9390,8956,7208,5204,3366,1802,815]
	8	[7,23,114,374,888,1903,3382,5146,7240,8936,9442,8878,7378,5288,3314,1822,793]
18	9	[7,80,307,834,1944,3939,6995,10780,14446,17200,18338,17264,14240,10494,6906,3455]
	8	[3,21,80,309,887,2025,4025,6904,10482,14270,17232,18426,17298,14350,10682,6928,3427]
19	9	[3,49,235,762,1962,4337,8410,14316,21524,28498,33538,35516,33592,28186,21024,12116]
	8	[1,15,62,243,791,2053,4516,8461,14068,21182,28204,33430,35694,33746,28312,21362,12230]
20	10	[31,162,665,1838,4446,9634,17725,29248,42979,55846,65682,69236,65228,55500,35208]
	9	[6,56,190,647,1967,4712,9728,17759,28913,42370,55492,65310,69294,65720,55912,35578]
21	10	[13,121,507,1635,4439,10204,20615,37192,59722,85477,110088,128259,134686,127584,88214]
	9	[3,35,151,543,1727,4638,10597,20932,37000,59117,84574,109179,127838,134788,128218,88912]

Figure 59 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=21, d_{free}=24, (15724153,12076311) code. (Continued . . .)

22(1)	10	[4,79,376,1419,4050,10287,22939,44239,77271,121188,170177,217008,250835,262590,194740]
	9	[2,21,106,442,1510,4280,10754,23490,44756,76917,119864,168744,215476,249848,262820,195446]
23	10	[1,45,274,1124,3580,9977,23911,49850,94337,160551,244654,338962,427668,490575,388279]
	9	[1,14,75,328,1248,3891,10425,24645,51210,94833,159286,243035,336303,424232,489254,388122]
24	10	[1,19,189,866,3060,9056,23715,54065,108732,199497,330469,493784,675204,843082,703876]
	9	[1,11,42,250,999,3334,9750,24701,55496,110882,199997,328461,490580,669887,837499,700922]
25(1)	11	[12,102,672,2472,7921,22573,55321,120123,235450,419484,677154,995742,1344103,1181144]
	10	[8,34,163,777,2797,8683,23842,57305,123100,238824,419735,673427,990041,1334139,1171934]
26	11	[9,62,424,1975,6770,20465,54301,126455,265362,505541,875909,1384635,2006266,1841997]
	10	[2,28,113,588,2275,7461,22011,56809,130763,271450,510317,875198,1378067,1995139,1828364]
27(2)	11	[3,39,289,1455,5525,17959,51126,127838,285887,581251,1077326,1820686,2824127,2700028]
	10	[1,13,92,417,1787,6344,19461,54164,133503,294553,591907,1084177,1819203,2812790,2684432]
28(6)	11	[3,16,197,1014,4416,15187,46149,124372,295976,640647,1263463,2276498,3772438,3735198]
	11	[7,62,310,1347,5162,17003,49725,130542,307863,657470,1281040,2289569,3768568,3721415]
29(6)	11	[2,10,117,720,3272,12581,40503,115763,295791,677989,1420107,2723643,4792947,4910950]
	11	[3,37,213,1055,4076,14222,44538,123596,309183,701615,1452542,2755222,4812167,4914831]
30(3)	11	[1,6,77,464,2421,9960,34411,104693,283878,692927,1535683,3119995,5832235,6153387]
	11	[2,20,140,771,3236,11614,38552,113565,300238,722189,1581983,3180783,5889721,6186778]
31(4)	12	[5,44,315,1700,7687,28262,91724,264360,682006,1602321,3443119,6804052,7391556]
	12	[16,90,529,2456,9390,32610,101237,282703,718076,1663484,3533574,6916182,7480640]
32(1)	12	[2,27,206,1178,5752,22563,78059,238041,650765,1616730,3663603,7644628,8529353]
	12	[8,66,353,1796,7425,26908,87924,259058,692564,1690164,3788994,7825832,8681212]
33(4)	13	[13,140,813,4117,17726,64474,207912,602728,1578892,3773444,8293197,9477755]
	12	[2,39,259,1299,5629,21785,74619,230966,649660,1666100,3930099,8549905,9719138]
34(2)	13	[9,72,578,2880,13505,52022,176874,542070,1495881,3767140,8710421,10177736]
	12	[2,22,159,953,4227,17089,62139,200716,593034,1599564,3953795,9037209,10518874]
35(3)	13	[4,48,370,2025,9897,41174,146918,473738,1379668,3649242,8869395,10596163]
	12	[2,11,101,639,3148,13368,50275,170628,527968,1493886,3874140,9272295,11010804]
36(1)	13	[2,30,225,1413,7165,31606,119317,404468,1236997,3440489,8777640,10688744]
	12	[2,6,62,427,2278,10135,39970,142473,459741,1360085,3695723,9255006,11211636]
37(2)	14	[17,140,983,5069,23600,94810,338044,1082135,3157917,8450696,10496067]
	12	[1,4,42,270,1606,7583,31103,116610,392317,1209672,3440054,9003619,11099761]
38	14	[10,80,660,3594,17228,73540,276268,925582,2830968,7924844,10027378]
	13	[5,19,196,1073,5531,23992,92935,328731,1055856,3124699,8547203,10723758]
39	14	[5,51,423,2443,12630,55750,220464,775021,2480284,7256585,9338596]
	13	[4,12,115,754,3932,18066,73292,269130,902940,2782890,7926493,10109208]
40(2)	14	[3,24,274,1665,9091,41313,172801,635651,2125588,6496060,8496125]
	13	[3,10,71,493,2769,13406,56623,216700,757595,2428723,7197379,9318616]
41	14	[1,16,158,1084,6552,30200,132815,510305,1785772,5692369,7556516]
	13	[1,12,32,344,1931,9622,43190,171732,623621,2080572,6406296,8411166]
42(2)	15	[10,88,706,4462,22275,99874,402642,1470108,4886457,6586212]
	13	[1,6,26,218,1334,6904,32025,134160,505652,1747852,5596482,7447824]

Figure 59 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=21, d_{free}=24, (15724153,12076311) code. (Continued . . .)

43	15	[7,50,440,3006,15983,74132,313132,1186045,4117583,5618487]
	13	[1,1,22,144,887,4923,23567,102387,403089,1446856,4799850,6468379]
44	15	[4,33,277,1956,11244,54449,238596,943238,3403520,4707090]
	14	[3,11,96,600,3418,17047,77468,315880,1176360,4050044,5522617]
45	15	[3,13,191,1279,7621,39535,179608,736964,2763867,3876463]
	14	[2,7,69,400,2298,12322,57521,243964,942580,3358402,4640296]
46	15	[2,10,103,838,5203,28064,133006 568233 2207935 3133081]
	14	[1,7,37,282,1588,8646,42256,185371,744122,2745203,3827544]
47	16	[9,73,483,3551,19658,97215,430008,1741372,2489804]
	15	[7,24,165,1125,6015,30579,139660,578040,2209350,3117444]
48	16	[4,49,311,2253,13674,70344,321754,1349332,1956007]
	15	[3,20,120,743,4214,21676,103468,444494,1752115,2498303]
49	16	[1,34,192,1431,9331,50016,238180,1031935,1508808]
	15	[2,11,88,494,2907,15451,75410,336874,1371910,1974472]
50	17	[18,128,908,6245,35109,173616,778958,1151527]
	15	[2,6,51,342,2030,10828,54582,251833,1060167,1540469]
51	17	[8,88,582,4129,24191,124883,581014,865604]
	15	[2,4,31,221,1386,7648,39202,185875,808506,1187180]
52	17	[4,49,413,2648,16480,88694,427563,643505]
	15	[2,3,15,149,934,5292,27976,136278,609379,901184]
53	17	[2,27,244,1824,11059,61965,310892,472036]
	16	[7,7,92,621,3609,19797,99120,454300,677802]
54	17	[2,14,149,1150,7489,43091,222806,341783]
	16	[3,12,55,401,2480,13858,71096,335954,504316]
55	18	[11,94,742,4917,29716,158012,244605]
	16	[1,9,41,261,1688,9531,50614,246431,370964]
56	18	[6,59,482,3220,20106,111324,172746]
	16	[1,5,29,171,1116,6609,35840,178299,271840]
57	18	[2,39,283,2149,13594,77202,121465]
	17	[4,22,113,742,4473,25109,128433,196025]
58	18	[2,17,183,1402,9084,53324,83813]
	17	[3,13,87,493,3007,17334,91951,140492]
59	18	[2,4,112,915,6018,36323,58096]
	17	[2,8,63,324,2034,11947,64913,100419]
60	19	[7,58,559,4040,24555,39370]
	17	[2,4,42,223,1381,8125,45571,70712]
61	19	[4,37,325,2621,16555,26676]
	17	[1,4,27,156,944,5549,31477,49853]
62	19	[2,22,207,1658,10982,17992]
	18	[5,17,104,637,3802,21905,33973]
63	19	[1,11,127,1074,7300,11643]
	18	[2,12,77,436,2579,15141,23668]

Figure 59 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=21, d_{free}=24, (15724153,12076311) code. (Continued . . .)

64	19	[1,6,72,668,4837,7754]
	18	[1,6,50,305,1777,10342,16446]
65	20	[6,43,406,3167,5082]
	19	[4,36,214,1168,7170,11190]
66	20	[5,26,250,2009,3367]
	19	[1,25,145,819,4858,7740]
67	20	[2,24,139,1237,2217]
	20	[14,101,550,3342,5264]
68	21	[9,111,764,1293]
	20	[6,64,375,2269,3653]
69	21	[6,50,499,854]
	20	[2,42,240,1540,2492]
70	21	[1,36,297,528]
	20	[1,20,170,1039,1635]
71	22	[19,188,311]
	20	[1,12,110,669,1165]
72	22	[9,113,199]
	20	[1,6,64,451,735]
73	22	[4,64,122]
	20	[1,3,44,276,501]
74	22	[1,32,77]
	21	[4,25,174,315]
75	22	[1,17,31]
	21	[2,16,116,184]
76	23	[13,12]
	21	[2,9,77,119]
77	23	[7,12]
	22	[9,45,85]
78	23	[2,10]
	22	[5,27,57]
79	23	[2]
	22	[1,21,29]
80	23	[1,2]
	23	[13,20]
81	23	[1]
	23	[7,12]
82	24	[2]
	23	[1,12]
83		[]
	24	[2]

Figure 59 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=21, d_{free}=24, (15724153,12076311) code.

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3	3	[1,2,1]
	3	[1,2,1]
4	4	[3,3,1,1]
	3	[1,1,3,3]
5	4	[2,3,6,4,0,1]
	4	[2,4,4,4,2]
6	5	[6,6,8,8,2,2]
	4	[1,4,7,8,7,4,1]
7	5	[3,9,13,15,13,7,3,1]
	4	[1,3,5,15,19,8,7,5]
8	6	[11,18,18,30,28,14,6,2,1]
	4	[1,2,5,15,27,31,23,13,8,3]
9	6	[6,18,35,42,50,54,28,14,8,0,1]
	5	[4,3,10,38,50,52,46,26,18,9]
10	6	[1,21,36,58,90,98,96,60,29,17,4,2]
	5	[2,5,11,32,64,94,106,84,54,37,19,4]
11	7	[12,42,73,116,173,196,170,120,70,34,13,4,1]
	5	[1,4,12,32,67,122,184,200,159,112,76,40,13,2]
12	7	[5,36,84,147,240,333,373,318,237,158,70,31,14,1,1]
	5	[1,1,12,35,64,142,253,342,377,317,222,151,86,36,9]
13	8	[29,83,164,305,489,653,688,615,479,309,172,71,27,11,0,1]
	5	[1,0,8,35,66,150,312,485,652,724,616,445,302,182,88,27,3]
14	8	[12,80,171,351,644,958,1265,1305,1174,980,621,353,184,62,23,7,2]
	5	[1,0,4,29,71,157,335,621,985,1269,1335,1199,917,607,373,199,74,15,1]
15	8	[6,51,175,387,744,1309,1934,2371,2512,2339,1880,1281,752,391,170,57,17]
	5	[1,0,3,21,62,166,362,714,1288,1934,2424,2580,2322,1810,1254,774,423,186,53,7]
16	8	[3,28,154,390,816,1619,2667,3763,4581,4839,4571,3707,2571,1593,849,393,148]
	5	[1,0,2,18,49,151,384,804,1546,2584,3764,4760,4978,4430,3600,2588,1589,896,442,147]
17	9	[18,114,363,849,1831,3378,5350,7430,8810,9390,8956,7208,5204,3366,1802,815]
	5	[1,0,2,14,41,132,363,872,1782,3192,5236,7492,9118,9584,8734,7048,5177,3368,1906,890]
18	9	[7,80,307,834,1944,3939,6995,10780,14446,17200,18338,17264,14240,10494,6906,3455]
	5	[1,0,2,12,32,120,325,849,2007,3788,6572,10664,14780,17596,18506,17034,13955,10436,6922,3543]
19	9	[3,49,235,762,1962,4337,8410,14316,21524,28498,33538,35516,33592,28186,21024,12116]
	5	[1,0,2,12,24,101,302,797,2041,4304,8022,13868,21320,28838,34388,35878,33139,27660,20886,12124]
20	10	[31,162,665,1838,4446,9634,17725,29248,42979,55846,65682,69236,65228,55500,35208]
	5	[1,0,2,12,21,83,267,743,1994,4573,9277,17161,28530,42558,56790,66934,69613,64794,54628,34636]
21	10	[13,121,507,1635,4439,10204,20615,37192,59722,85477,110088,128259,134686,127584,88214]
	6	[2,1,4,26,67,231,667,1836,4741,10232,19977,36196,58592,85078,111438,130000,135292,127097, 87520]

Figure 60 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=22, d_{free}=24, (33455341,24247063) code. (Continued . . .)

22	10 6	[4,79,376,1419,4050,10287,22939,44239,77271,121188,170177,217008,250835,262590,194740] [1,2,4,21,57,187,608,1718,4544,10701,22626,43401,75248,118954,170408,219100,253433,263844, 194243]
23(1)	10 6	[1,45,274,1124,3580,9977,23911,49850,94337,160551,244654,338962,427668,490575,388279] [1,1,5,18,47,170,520,1558,4330,10655,24220,49882,92326,156220,241793,339646,431333,494703, 389913]
24	11 6	[28,176,851,3042,9205,23730,53584,109216,199578,329624,495037,675042,841791,704942] [1,1,3,17,46,146,447,1382,4045,10386,24782,54616,108163,195051,323516,490255,676082,848347, 709793]
25	11 7	[15,115,615,2434,8138,22607,54891,120326,235902,418467,677239,997638,1343366,1178935] [3,2,11,45,121,395,1176,3631,9990,24692,57416,121211,232817,411267,665870,989521,1346116, 1185756]
26	11 7	[8,76,414,1902,6808,20670,54226,126047,265883,505713,874103,1385968,2008654,1840692] [1,5,11,30,106,355,1046,3113,9228,24342,58343,130210,266383,499117,860960,1365967,1994316, 1842513]
27(1)	11 8	[3,47,289,1403,5525,18074,51113,127691,286196,581616,1075749,1819757,2827456,2701858] [4,11,30,87,279,942,2783,8252,23003,57907,135887,293378,580067,1061897,1794531,2792872, 2678840]
28(2)	11 8	[3,26,188,1008,4321,15290,46329,124058,296486,640520,1262344,2277068,3772126,3735524] [3,7,27,83,235,818,2495,7358,21126,55939,137310,311665,651438,1258039,2249022,3721629, 3690030]
29	12 8	[19,113,743,3212,12412,40860,115843,295113,679156,1420538,2720223,4793570,4912522] [1,6,25,75,206,667,2163,6625,19277,52622,134995,321879,706373,1434565,2707511,4740235, 4847717]
30(2)	12 9	[12,71,486,2415,9849,34300,105082,283918,692208,1538042,3119493,5825672,6156346] [6,17,57,200,576,1868,5851,17270,48820,129722,322307,742684,1584828,3142162,5794194,6092537]
31(1)	12 9	[5,54,293,1801,7495,28158,92054,263882,682628,1603298,3443492,6801670,7385737] [3,16,45,161,534,1615,5050,15448,44565,122196,315801,758213,1694495,3529770,6834356,7358817]
32(1)	12 9	[3,32,196,1228,5710,22505,77831,237812,651884,1616473,3664801,7647140,8523333] [1,11,40,128,466,1416,4348,13644,40288,113394,302691,755729,1762555,3838695,7794619,8600181]
33(2)	12 9	[2,20,128,840,4122,17615,64352,207986,602676,1578598,3775591,8295662,9480375] [1,7,28,110,394,1231,3817,11945,35937,103600,284976,737393,1787761,4059838,8618286,9713906]
34(1)	12 9	[2,13,73,582,2948,13300,52062,176717,541769,1496964,3765361,8714214,10183813] [1,5,19,89,333,1073,3318,10338,31818,93804,264375,705556,1772457,4185768,9263253,10652045]
35(2)	12 10	[1,11,45,360,2140,9814,40907,147159,472817,1379342,3651566,8869871,10596152] [3,15,63,267,900,2879,9052,27924,83981,241769,663899,1725020,4218256,9701925,11355834]
36(2)	13 10	[6,40,220,1461,7206,31379,119411,403787,1236787,3440887,8774814,10698350] [1,11,47,199,749,2483,7848,24473,74531,218648,615719,1647448,4165199,9933444,11809968]
37(2)	13 11	[4,26,150,966,5185,23619,94722,336920,1081798,3159249,8447314,10494164] [5,35,156,587,2049,6838,21377,65641,196336,563038,1548591,4040527,9954630,12012860]
38(1)	13 11	[4,13,98,666,3606,17511,73662,274871,924669,2829306,7927570,10023123] [2,22,112,458,1683,5835,18591,57439,174656,510810,1435115,3850316,9791181,11977382]

Figure 60 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=22, d_{free}=24, (33455341,24247063) code. (Continued . . .)

39	13	[1,10,65,452,2494,12647,56332,219816,773677,2476965,7255687,9341980]
	11	[1,12,80,343,1344,4872,16003,50212,154203,458636,1314857,3615950,9464938,11715505]
40(2)	13	[1,5,47,288,1735,9015,42166,172569,634261,2123190,6490304,8495271]
	12	[5,50,247,1053,3993,13524,43494,135537,408764,1192974,3352622,9005322,11271653]
41	14	[6,22,204,1150,6441,31042,132678,510856,1782601,5684787,7552340]
	12	[1,28,186,798,3136,11290,37237,118134,362014,1072375,3073304,8452993 10680874]
42(1)	14	[3,19,123,797,4422,22632,100672,403508,1467853,4880847,6577033]
	12	[1,16,113,594,2479,9163,31530,102187,317665,956653,2789579,7836154,9991891]
43(2)	15	[13,89,514,3082,16144,75127,314136,1187155,4109616,5616085]
	13	[7,70,402,1892,7345,26257,87504,276445,847007,2510923,7184557,9231745]
44	15	[6,59,361,2082,11386,55278,240335,944994,3399535,4702811]
	13	[4,52,286,1359,5782,21421,73504,238800,743459,2240819,6527713,8439767]
45	15	[2,38,242,1425,7955,40055,181240,740657,2764451,3872119]
	13	[2,38,203,970,4415,17150,61003,203860,647096,1982237,5876386,7651159]
46(1)	15	[1,25,144,981,5559,28664,134697,571594,2212945,3135704]
	14	[28,141,702,3312,13431,49818,171443,557663,1740429,5243666,6868851]
47	16	[18,93,633,3876,20291,99021,434372,1745443,2499422]
	14	[15,103,493,2403,10448,40008,142180,475594,1513500,4639655,6115494]
48	16	[12,54,417,2677,14273,71724,326249,1356539,1963167]
	14	[11,74,353,1755,7919,31606,116222,399927,1302959,4070782,5399048]
49(1)	16	[6,37,264,1788,10081,51398,241805,1040897,1519192]
	14	[2,46,272,1232,5857,24643,93629,332291,1109808,3537309,4722602]
50	16	[4,20,175,1212,6862,36691,177589,787691,1161796]
	14	[1,26,168,908,4367,18780,74244,272026,934053,3045384,4091263]
51	16	[2,13,112,794,4731,25756,128812,590789,874981]
	15	[17,115,624,3125,14238,58297,219634,776109,2592723,3511886]
52	16	[4,49,413,2648,16480,88694,427563,643505]
	15	[5,76,429,2242,10579,44956,175160,636392,2182507,2981880]
53	16	[1,8,27,356,2145,12454,66128,320163,483121]
	15	[4,44,303,1582,7750,34122,137872,516253,1814749,2500407]
54	16	[1,6,16,218,1448,8539,46463,233004,352464]
	15	[1,33,200,1078,5613,25694,106858,413191,1492828,2071958]
55	16	[1,4,13,116,1018,5707,32507,167543,255797]
	16	[17,124,777,4006,18912,81959,326196,1212754,1700420]
56	16	[1,4,9,68,650,3966,22360,118832,184518]
	16	[7,90,514,2845,14016,61718,254076,973682,1376739]
57	17	[3,10,49,371,2723,15418,83653,130265]
	16	[4,44,372,1930,10034,46657,195708,770854,1101892]
58	17	[1,10,36,239,1744,10667,58609,91252]
	16	[2,29,222,1354,7071,34239,149857,605198,866992]
59	17	[1,6,24,158,1124,7245,40797,63947]
	16	[2,14,143,930,4950,24771,112992,470031,678885]

Figure 60 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=22, d_{free}=24, (33455341,24247063) code. (Continued . . .)

60	18	[4,20,110,729,4808,28143,44584]
	16	[1,9,87,614,3476,17808,83612,360716,526246]
61	18	[2,13,71,504,3231,19120,30624]
	16	[1,4,54,398,2396,12690,61270,272849,402807]
62	18	[1,11,41,322,2246,12893,20820]
	17	[5,28,248,1598,8960,44476,204047,303710]
63	18	[1,5,33,215,1426,8985,13842]
	17	[3,18,165,1051,6168,32091,151175,225738]
64	18	[1,3,21,140,930,6103,9604]
	17	[1,11,111,734,4185,22678,110721,167401]
65	18	[1,0,17,96,627,3997,6625]
	17	[1,6,58,503,2894,15774,80186,122209]
66	18	[1,0,8,65,402,2737,4239]
	17	[1,3,34,318,1955,11037,57391,87986]
67	19	[2,2,45,276,1736,3046]
	18	[2,23,192,1323,7575,40748,62969]
68	19	[1,3,22,194,1153,1885]
	18	[1,9,136,849,5109,28689,44682]
69	19	[1,2,13,117,789,1251]
	18	[1,3,74,574,3491,19847,31240]
70	20	[3,9,71,534,818]
	18	[1,2,44,374,2374,13747,21385]
71	20	[1,11,40,346,569]
	18	[1,0,27,233,1586,9419,14948]
72	21	[8,32,203,392]
	19	[2,15,137,1032,6403,10271]
73	21	[4,27,127,231]
	19	[1,10,85,650,4313,6924]
74	21	[3,10,100,144]
	19	[1,6,56,410,2870,4596]
75	21	[1,8,63,104]
	20	[5,37,266,1884,3035]
76	22	[6,45,56]
	20	[1,22,175,1235,2006]
77	22	[2,33,42]
	21	[14,105,810,1319]
78	22	[1,18,35]
	21	[5,69,516,865]
79	22	[1,11,15]
	21	[3,42,338,524]
80	22	[1,7,9]
	22	[25,200,387]

Figure 60 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=22, d_{free}=24, (33455341,24247063) code. (Continued . . .)

81	23	[5,8]
	22	[14,117,224]
82	23	[3,4]
	22	[7,80,109]
83	23	[2,2]
	22	[4,53,70]
84	24	[4]
	22	[2,22,72]
85		[]
	22	[2,9,28]
86		[]
	22	[2,3,14]
87		[]
	23	[6,2]
88		[]
	23	[3,6]
89		[]
	23	[1,4]
90		[]
	23	[1]
91		[]
	23	[1]
92		[]
	23	[1]
93		[]
	23	[1]
94		[]
	24	[2]

Figure 60 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=22, d_{free}=24, (33455341,24247063) code.

1	2	[1]
	2	[1]
2	3	[2]
	3	[2]
3	3	[1,2,1]
	3	[1,2,1]
4	4	[3,3,1,1]
	3	[1,1,3,3]

Figure 61 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=23, d_{free}=25, (55346125,75744143) code. (Continued . . .)

5	4	[2,3,6,4,0,1]
	4	[2,4,4,4,2]
6	5	[6,6,8,8,2,2]
	4	[1,4,7,8,7,4,1]
7	5	[3,9,13,15,13,7,3,1]
	5	[3,11,11,11,17,9,1,1]
8	6	[11,18,18,30,28,14,6,2,1]
	5	[2,7,19,23,23,29,17,5,3]
9	6	[6,18,35,42,50,54,28,14,8,0,1]
	5	[1,5,19,34,40,52,52,30,15,7,1]
10	6	[1,21,36,58,90,98,96,60,29,17,4,2]
	6	[5,14,36,69,82,92,96,66,33,14,4,1]
11	7	[12,42,73,116,173,196,170,120,70,34,13,4,1]
	6	[3,12,30,82,135,152,180,180,129,76,30,10,5]
12	7	[5,36,84,147,240,333,373,318,237,158,70,31,14,1,1]
	6	[2,9,25,79,171,246,308,350,328,261,161,67,27,12,2]
13	8	[29,83,164,305,489,653,688,615,479,309,172,71,27,11,0,1]
	6	[2,6,19,69,181,340,483,591,673,646,497,323,167,64,25,9,1]
14	8	[12,80,171,351,644,958,1265,1305,1174,980,621,353,184,62,23,7,2]
	7	[8,14,52,183,377,660,970,1161,1275,1246,992,649,351,160,66,23,5]
15	8	[6,51,175,387,744,1309,1934,2371,2512,2339,1880,1281,752,391,170,57,18,6]
	7	[3,16,47,150,394,788,1340,1906,2268,2456,2398,1946,1310,756,372,158,57,16,3]
16	8	[3,28,154,390,816,1619,2667,3763,4581,4839,4571,3707,2571,1593,849,393,156,46]
	7	[2,12,36,129,381,859,1655,2691,3691,4455,4803,4593,3805,2657,1589,833,375,145,43]
17	9	[18,114,363,849,1831,3378,5350,7430,8810,9390,8956,7208,5204,3366,1802,890,366]
	7	[1,7,33,107,338,873,1862,3446,5384,7248,8680,9324,8946,7412,5306,3386,1815,833,353]
18	9	[7,80,307,834,1944,3939,6995,10780,14446,17200,18338,17264,14240,10494,6906,3908,1783]
	7	[1,2,27,93,285,839,1954,4007,7130,10720,14234,16970,18154,17346,14488,10694,7013,3894,1722]
19	9	[3,49,235,762,1962,4337,8410,14316,21524,28498,33538,35516,33592,28186,21024,14048,7432]
	8	[3,17,70,250,755,1960,4392,8519,14464,21478,28044,33104,35470,33604,28336,21618,14347,7272]
20	10	[31,162,665,1838,4446,9634,17725,29248,42979,55846,65682,69236,65228,55500,42242,24504]
	8	[1,12,55,202,661,1860,4541,9637,17911,29449,42815,55360,64742,68796,65630,55950,42867,25206]
21	10	[13,121,507,1635,4439,10204,20615,37192,59722,85477,110088,128259,134686,127584,109358,
	9	69880]
		[7,43,158,559,1703,4457,10270,20852,37524,59798,85072,109291,126942,133746,127980,110320,
		70866]
22	10	[4,79,376,1419,4050,10287,22939,44239,77271,121188,170177,217008,250835,262590,249470,
	9	173138]
		[1,32,128,463,1481,4195,10483,22850,44776,78016,120873,169685,215462,248099,261390,250188,
		174114]

Figure 61 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=23, d_{free}=25, (55346125,75744143) code. (Continued . . .)

23	10 10	[1,45,274,1124,3580,9977,23911,49850,94337,160551,244654,338962,427668,490575,512891, 380852] [16,102,368,1284,3800,10117,24118,50422,95126,161082,244530,337782,424554,486353,510652, 380854]
24	11 10	[28,176,851,3042,9205,23730,53584,109216,199578,329624,495037,675042,841791,961354,758130] [8,67,292,1068,3370,9465,24116,54414,109936,201007,330904,493732,672610,836565,953744, 754090]
25	11 10	[15,115,615,2434,8138,22607,54891,120326,235902,418467,677239,997638,1343366,1659735, 1382228] [7,35,214,869,2921,8609,23087,56253,121572,237325,421536,678137,995323,1338437,1649677, 1371447]
26	11 10	[8,76,414,1902,6808,20670,54226,126047,265883,505713,874103,1385968,2008654,2670340, 2332516] [3,24,150,673,2395,7668,21752,55407,128414,268505,508893,879434,1386661,2003198,2660818, 2319293]
27	11 10	[3,47,289,1403,5525,18074,51113,127691,286196,581616,1075749,1819757,2827456,4037190, 3674183] [3,12,100,496,1974,6543,19656,53437,130402,290352,587638,1082207,1826800,2828974,4026756, 3662157]
28	12 11	[27,198,1020,4299,15237,46457,123933,296205,641179,1262833,2275803,3770593,5757629, 5450321] [13,58,355,1542,5502,17360,49563,128463,302418,649615,1273533,2288817,3783504,5755793, 5440448]
29(3)	12 11	[13,124,724,3276,12511,40379,115900,296132,678183,1420174,2722718,4790734,7787363,7644945] [5,49,243,1112,4512,14999,44813,122576,304319,691461,1437825,2741813,4818353,7807391, 7644232]
30	12 11	[6,79,485,2408,9955,34350,104397,284152,693490,1536664,3120250,5826467,10046321,10185738] [5,27,177,801,3499,12583,39586,113863,297083,710920,1562672,3154527,5870513,10092238, 10216667]
31(1)	12 11	[3,49,317,1719,7643,28401,91391,263596,683512,1603491,3443604,6801752,12408965,12961416] [3,19,119,588,2633,10147,34168,103013,282071,709269,1640700,3495092,6872057,12495158, 13024477]
32	12 12	[2,26,216,1196,5649,22739,78152,237098,650672,1617960,3666957,7645070,14728167,15811473] [15,84,407,1989,7974,28458,90993,261333,687703,1669899,3743901,7752421,14865011,15932980]
33(1)	12 12	[2,11,145,831,4060,17639,64890,207808,601326,1578518,3776677,8299404,16839968,18553333] [8,56,298,1429,6199,23244,77770,235956,651037,1653033,3885311,8454891,17058109,18740537]
34(2)	12 12	[1,9,85,554,2934,13334,52066,177799,540253,1494872,3769735,8711595,18608187,20992915] [4,32,217,1049,4673,18460,65222,207766,600096,1595158,3921522,8937549,18928977,21286030]
35	12 12	[1,4,55,355,2098,9850,40695,148144,473376,1375838,3652719,8871132,19897502,22968979] [2,19,154,762,3414,14412,53605,178392,540310,1501421,3855737,9188077,20362794,23398237]
36	12 13	[1,4,33,218,1436,7247,31315,119399,404968,1236251,3439031,8774988,20646510,24333637] [12,106,539,2523,10979,42954,150013,475693,1380418,3697969,9200553,21297511,24959214]

Figure 61 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=23, d_{free}=25, (55346125,75744143) code. (Continued . . .)

37(1)	13	[6,18,143,960,5138,23683,94324,338115,1083447,3155859,8446477,20817507,25033805]
	13	[5,59,399,1838,8290,33778,123523,409155,1239686,3468717,8991081,21695183,25896438]
38	13	[4,16,88,635,3586,17521,73194,275411,927560,2829379,7921181,20434370,25038713]
	14	[39,275,1303,6171,26263,99484,345023,1090994,3178087,8585734,21570290,26192528]
39(1)	13	[3,8,72,421,2371,12826,55993,219274,775481,2481404,7253956,19549254,24398888]
	14	[18,182,919,4589,19949,78911,285552,940022,2851216,8017910,20962660,25858244]
40(2)	13	[2,6,45,309,1605,8965,41967,172204,635143,2126346,6494324,18268244,23180626]
	14	[9,105,669,3266,15050,61813,231300,795307,2508629,7329924,19925852,24969407]
41	13	[2,4,35,195,1127,6222,30912,132091,511357,1783919,5691362,16694111,21510453]
	14	[4,69,424,2354,11222,47415,185009,659840,2165929,6571716,18541480,23598690]
42(1)	14	[8,22,130,763,4362,22281,99757,403383,1469964,4885769,14929983,19537426]
	14	[3,39,279,1627,8217,36041,145563,538882,1834684,5781444,16926243,21827797]
43	14	[4,20,86,523,2988,15982,74272,313031,1187491,4112382,13088509,17374536]
	14	[1,18,184,1157,5766,27049,113209,432966,1528399,4994419,15165943,19811725]
44	14	[2,15,61,376,2006,11308,54629,238790,942887,3401872,11254209,15135787]
	14	[1,9,114,746,4186,19857,86449,343607,1252975,4241905,13343360,17661776]
45	15	[10,50,265,1368,7876,39620,179615,737763,2763330,9500569,12954030]
	14	[1,6,64,496,2907,14453,65166,268144,1013363,3546026,11539969,15463821]
46(1)	15	[3,34,191,968,5423,28556,133161,568390,2208530,7883508,10882056]
	15	[6,40,291,2032,10391,48317,206714,807214,2919251,9826419,13309399]
47	15	[1,21,135,703,3735,20169,97794,431717,1739998,6432303,8990023]
	15	[2,28,182,1356,7312,35530,157277,633960,2369708,8237523,11285097]
48	15	[1,10,94,476,2662,14264,70693,323677,1351547,5170695,7302975]
	15	[2,7,133,876,5103,25835,117506,491778,1899051,6805343,9419829]
49	15	[1,4,57,334,1876,9987,50886,240265,1034575,4097390,5847851]
	15	[1,5,75,581,3506,18379,87126,376481,1500279,5547492,7754175]
50	15	[1,1,35,204,1359,7059,36209,176109,782660,3204334,4613856]
	16	[5,47,359,2337,13045,63783,284516,1169761,4462694,6297676]
51	15	[1,0,19,135,919,4942,25859,127990,585585,2472834,3594961]
	16	[4,26,238,1552,8999,46207,212307,901337,3543110,5048624]
52	16	[2,7,101,598,3351,18531,92184,434166,1884694,2767022]
	16	[1,18,155,1023,6162,32812,156811,686709,2778331,3993862]
53	16	[1,8,52,401,2346,12883,66350,318500,1422671,2101614]
	16	[1,11,80,716,4161,23062,114303,516341,2155011,3120938]
54	17	[5,36,252,1612,8987,47151,232196,1062656,1582444]
	17	[7,56,435,2835,16129,82079,383821,1651970,2412286]
55	17	[2,21,178,1043,6318,33297,167483,787232,1179245]
	17	[3,40,265,1921,11122,58366,281985,1251642,1843155]
56	18	[15,105,711,4305,23440,120287,577646,871055]
	17	[2,27,165,1233,7644,41235,205035,937236,1391870]
57	18	[9,60,482,2889,16431,85708,421009,637405]
	18	[16,114,763,5225,28871,147152,695155,1039015]

Figure 61 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=23, d_{free}=25, (55346125,75744143) code. (Continued . . .)

58	18	[1,48,313,1931,11347,60816,304211,464079]
	18	[9,72,514,3374,20117,105205,508856,768841]
59	19	[24,217,1311,7715,42610,218795,334631]
	18	[5,50,328,2259,13664,74252,370066,561159]
60	19	[11,144,849,5302,29770,155682,240198]
	18	[2,34,212,1513,9138,51998,266533,406443]
61	19	[6,89,571,3498,20911,109998,170468]
	18	[1,21,144,956,6293,35862,189322,293345]
62	19	[4,53,353,2405,14187,77658,120550]
	19	[13,95,631,4194,24654,133614,207422]
63	19	[2,28,236,1583,9660,54225,84772]
	19	[9,55,419,2784,16852,93664,145654]
64	20	[17,150,1023,6571,37471,59181]
	19	[2,48,249,1797,11594,64925,102083]
65	20	[8,90,634,4464,25866,40576]
	19	[2,23,177,1144,7800,44851,70789]
66	20	[6,43,407,2950,17700,28063]
	19	[1,13,114,759,5046,30831,48945]
67	20	[3,28,240,1919,12035,19101]
	19	[1,6,70,506,3380,20836,33225]
68	20	[2,16,153,1199,8055,13029]
	19	[1,4,42,329,2243,14051;22472]
69	21	[11,95,766,5283,8673]
	20	[5,26,208,1465,9407,15235]
70	21	[7,53,463,3506,5640]
	20	[2,12,158,953,6195,10227]
71	21	[5,29,283,2266,3716]
	20	[1,8,101,607,4142,6711]
72	21	[2,22,165,1455,2375]
	21	[7,60,403,2742,4424]
73	22	[12,113,896,1539]
	21	[4,37,273,1770,2985]
74	22	[5,62,592,926]
	21	[1,28,170,1172,1915]
75	22	[3,40,337,656]
	22	[14,117,790,1213]
76	22	[1,24,206,364]
	22	[5,73,516,861]
77	23	[12,135,208]
	22	[3,38,336,556]
78	23	[4,81,144]
	22	[1,24,198,370]

Figure 61 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=23, d_{free}=25, (55346125,75744143) code. (Continued . . .)

79	23	[1,47,81]
	22	[1,10,139,186]
80	24	[24,50]
	22	[1,6,82,138]
81	24	[9,30]
	22	[1,5,45,85]
82	24	[5,8]
	23	[5,23,55]
83	24	[1,8]
	23	[3,16,25]
84	25	[2]
	23	[2,11,16]
85		[]
	23	[2,4,16]
86		[]
	24	[8]
87		[]
	24	[3,10]
88		[]
	24	[2,2]
89		[]
	24	[1,2]
90		[]
	24	[1]
91		[]
	24	[1]
92		[]
	25	[2]

Figure 61 Forward and reverse column weight distribution for the optimum distance profile R=1/2, v=23, d_{free}=25, (55346125,75744143) code.