Table 1. Some bounds for $MinD(M,n,2,t)$, $MaxD(M,n,2,t)$ and $CR(M,n,2,t)$ for some small values of M, n and t.

Strength t	Cardinality M	Length n	Minimum distance bounds	Covering radius bounds	Fazekas-Levenshtein bounds [2]
t	2^t	$t+1$	2^{c0}	1	1
t	2^{t+1}	$t+2$	1-2^{c1}	1	1
t	2^{t+2}	$t+3$	1-2^{c2}	1	1
2	8	5	2^{c2}	1^*	2
2	8	6	3^{c2}	2	2.5
2	8	7	4^{c2}	3	3
2	12	8	3	3	3.5
2	12	9	4	4	4
2	12	10	5	4	4.5
2	12	11	6	5	5
2	16	12	5-6	5	5.5
2	16	13	6	5^*	6
2	16	14	7	6	6.5
2	16	15	8	7	7
2	20	15	6-7	6^*	7
2	20	16	7	7	7.5
2	20	17	8	7^*	8
2	20	18	9	8	8.5
2	20	19	10	9	9
2	32	8	1-3	3	3.5
2	32	9	1-4	3^*	4
2	32	10	1-4	4	4.5
2	32	11	1-5	4^*	5
2	32	12	1-5	5	5.5
2	32	13	1-6	6	6
2	32	21	4-10	9^*	10
2	32	22	5-11	10	10.5
3	16	6	2^{c2}	1	1.77
3	16	7	3^{c2}	1^*	2.17
3	16	8	4^{c2}	2	2.58

Strength t	Cardinality M	Length n	Minimum distance bounds	Covering radius bounds	Fazekas-Levenshtein bounds
3	24	8	2-3	2	2.58
3	24	9	3	3	3
3	24	10	4	3	3.42
3	24	11	5	3	3.84
3	24	12	6	4	4.26
3	32	12	4-5	4	4.26
3	32	13	5	4	4.69
3	32	14	6	4*	5.13
3	32	15	7	5	5.56
3	32	16	8	6	6
3	40	16	6-7	5*	6
3	40	17	7	6	6.44
3	40	18	8	6	6.87
3	40	19	9	6*	7.32
3	40	20	10	7	7.76
3	64	10	1-3	3	3.42
3	64	11	1-4	3	3.84
3	64	12	1-4	4	4.26
3	64	13	1-5	4	4.69
3	64	14	1-6	5	5.13
3	64	19	3-8	7	7.32
3	64	20	3-9	7	7.76
4	64	8	2	1*	2.17
4	128	10	1-3	2*	3
4	128	11	2-3	2*	3.41
4	128	12	3-4	3	3.84
4	128	13	4	3*	4.26
4	128	14	5	4	4.70
4	128	15	6	5	5.12
5	128	9	2	1*	2

Remark. The single value in the column with minimum distance bounds shows that lower and upper bounds coincide, i.e. every OA with the corresponding M, n, q, and t has this minimum distance and, therefore, $MinMD(M, n, q, t) = MaxMD(M, n, q, t)$ in such cases. For example, $MinMD(20, 16, 2, 2) = MaxMD(20, 16, 2, 2) = 7$.

The results are compared to Theorems IV.2 and IV.5 [1] for the minimum distance problem, while the covering radius bounds are compared to Fazekas-Levenshtein bounds [13, Theorem 2]. In all completed cases we obtain the same or better bound.

The cases where the bounds from Section 4 in [1] are obtained are marked as follows:

– $c0$ obtained by (10);

– $c1$ obtained by Corollary IV.4;

– $c2$ obtained by Corollary IV.6;

– $*$ the case where our bound is better than the Fazekas-Levenshtein bound.

The results in the Table 1 are extracted from the database below.

REFERENCES

[1] Silvia Boumova; Peter Boyvalenkov; Maya Stoyanova, Bounds for the minimum distance and covering radius of orthogonal arrays via their distance distributions, submitted.

[2] Fazekas, G.; Levenshtein, V.I. On upper bounds for code distance and covering radius of designs in polynomial metric spaces. *Journal of Combinatorial Theory Ser. A*, 70, 267–288, 1995.