Spectrum of sizes for perfect 2-deletion-correcting codes of length 4.

Summary: Perfect $t$-deletion-correcting codes of length $n$ over the alphabet of size $q$, denoted by perfect $(n, t)_q$-DCCs, can have different number of codewords, because the balls of radius $t$ with respect to Levenshtein distance may be of different sizes. Thus determining all possible sizes of a perfect $t$-deletion-correcting code makes sense. When $t = n - 2$, $t$-deletion-correcting codes are closely related to directed packings, constructions of which are based on the tools of design theory. Recently, Chee, Ge and Ling determined completely the spectrum of possible sizes for perfect $q$-ary 1-deletion-correcting codes of length three for all $q$, and perfect $q$-ary 2-deletion-correcting codes of length four for all but 19 values of $q$. In this paper, we continue to investigate the spectrum problem for perfect $(4, 2)_q$-DCCs. By constructing a considerable number of incomplete directed packings, we give an almost complete solution to the spectrum problem of sizes for perfect $(4, 2)_q$-DCCs, leaving the existence of $(4, 2)_{19}$-DCC of size 62 and $(4, 2)_{34}$-DCC of size 196 in doubt.

Keywords: deletion-correcting codes; directed packings; group divisible designs; optimal codes; perfect codes
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