An efficient construction of self-dual codes.

Summary: Self-dual codes have been actively studied because of their connections with other mathematical areas including $t$-designs, invariant theory, group theory, lattices, and modular forms. We presented the building-up construction for self-dual codes over $GF(q)$ with $q \equiv 1 \pmod{4}$, and over other certain rings (see [19],[20]). Since then, the existence of the building-up construction for the open case over $GF(q)$ with $q = p^r \equiv 3 \pmod{4}$ with an odd prime $p$ satisfying $p \equiv 3 \pmod{4}$ with $r$ odd has not been solved. In this paper, we answer it positively by presenting the building-up construction explicitly. As examples, we present new optimal self-dual $[16,8,7]$ codes over $GF(7)$ and new self-dual codes over $GF(7)$ with the best known parameters [24,12,9].

Keywords: building-up construction; linear codes; self-dual codes

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