BINARY SEQUENCES WITH GOLD-LIKE CORRELATION PROPERTIES BUT LARGER LINEAR SPAN

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Abstract

A new family B of binary sequences, which are optimal with respect to Sidelnikov's lower bound on the maximum nontrivial correlation magnitude of a family of binary sequences, are introduced and analyzed.

Let $r \geq 3$ be an odd integer. The family contains has $2^r + 1$ cyclically distinct sequences, each of which have period $2^r - 1$. The family has maximum nontrivial correlation magnitude is given by $C_{max} = 2^{(r+1)/2} + 1$. With the exception of the single m-sequence, each of the sequences in B has linear span at least $(r^2 - r)/2$. Therefore B is an optimal family with a large linear span. Thus, while the correlation properties and family size are identical to that of the Gold family, the linear span is larger.

B is suitable for achieving Code Division Multiple Access. The sequences in B can be implemented using shift registers with nonlinear feedforward logic.