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Properties and Parameters of Codes from Line Graphs of Circulant Graphs

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Abstract of Poster Presentation: Linear codes from neighborhood designs of strongly regular graphs such as triangular, lattice and Paley graphs have been extensively studied over the past decade. Most of these families of graphs are line graphs of a much larger class known as circulant graphs, $\Gamma_n(S)$.
In this project we extend the earlier results to find binary codes $C_n(S)$ from line graphs of $\Gamma_n(S)$.
We show that when $n/2 \notin S$, $C_n(S)$ is a

$$\left[n|S|, n - \frac{2 \cdot gcd(n,S)}{(2 - f(\alpha, D))}, 2 + 2(1 + f(\alpha, S))(|S| - 1)\right]$$

code, and when $n/2 \in S$, $C_n(S)$ is a

$$\left[\frac{n}{2}(2|S| - 1), n - \frac{2 \cdot gcd(n,S)}{(2 - f(\alpha, D))}, 4(|S| - 1)\right]$$

code, where $n = 2^\alpha(1 + 2\beta) \geq 4$ and $f(\alpha, S) = \left\lceil \frac{gcd(S) \, mod \, (2^\alpha)}{2^\alpha} \right\rceil$.
We prove that $C_n(S)$ are even weight codes for $n/2 \notin S$ and find classes of self-orthogonal and linear complimentary dual codes. Further, we find information sets and show that these codes contain bases of minimum weight vectors.

[Joint work with Alexander N. Westbrooks]

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