

GRADUATE SEMINAR

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Fusions of the generalized Hamming scheme on a strongly regular graph

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Abstract

We say \mathcal{B} is a fusion of an association scheme \mathcal{A} , if it is an association scheme where each basis element of \mathcal{B} is a union of basis elements of \mathcal{A} . One of the most important example of an association scheme for coding theory is the Hamming scheme $H(n, q)$.

Suppose $\mathcal{A} = \{A_0, A_1, A_2\}$ be a rank 3 association scheme and both A_1 and A_2 are adjacency matrices of strongly regular graphs. The generalized Hamming scheme

$$H(2, \mathcal{A}) = \{A_0 \otimes A_0, A_1 \otimes A_1, A_2 \otimes A_2, (A_0 \otimes A_1) + (A_1 \otimes A_0), \\ (A_0 \otimes A_2) + (A_2 \otimes A_0), (A_1 \otimes A_2) + (A_2 \otimes A_1)\}$$

is one of the fusions of the rank 9 association scheme, $\mathcal{A} \otimes \mathcal{A}$. In this presentation we determine the parameters of all strongly regular graphs for which the generalized Hamming scheme has extra fusions in addition to the one arising from the trivial fusion of \mathcal{A} . We also show that for any fusion \mathcal{B} of \mathcal{A} , the generalized Hamming scheme $H(n, \mathcal{B})$ is a nontrivial fusion of $H(n, \mathcal{A})$.