

An equation for the Riemann curvature tensor, strongly regular graphs, and finite fields

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(Joint work with Christopher Deninger and Theo Grundhöfer.)

Abstract

We study solutions of a quadratic matrix equation arising in Riemannian geometry. Let S be a real symmetric $n \times n$ -matrix with zeros on the diagonal and let θ be a real number. We are interested in solutions of the equations $\sum_k S_{i,k} S_{k,j} + S_{i,j}^2 = \theta S_{i,j}$, for $i < j$, and $\sum_k S_{i,k} = 0$. Our solutions relate the equations to strongly regular graphs, to group rings, and to multiplicative characters and Jacobi sums in finite fields.