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Bivariate P - and Q -polynomial structures of association schemes based on attenuated spaces

Recently, bivariate and multivariate generalizations of the P - and Q -polynomial properties of association schemes have been proposed, and several examples of higher rank association schemes have been shown to fit within the generalized framework. In particular, bivariate P - and Q -polynomial structures have been obtained for association schemes based on attenuated spaces. While the bivariate P -polynomial structure can be analyzed using combinatorial arguments with the adjacency matrices, the same cannot be done with the bivariate Q -polynomial structure and the primitive idempotents, which complicates the proof. In this talk, I will explain how both the bivariate P - and Q -polynomial structures of association schemes based on attenuated spaces can be examined using recurrence relations and difference equations of the bivariate polynomials which form the eigenvalues and dual eigenvalues of the scheme. I will furthermore discuss the bispectral algebra associated to the bivariate polynomials as well as the Terwilliger algebra of the scheme.