1141-05-268
William J. Martin* (martin@wpi.edu), Dept. of Mathematical Sciences, 100 Institute Road, Worcester Polytechnic Institute, Worcester, MA 01609, and Jason S. Williford (jwillif1@uwyo.edu), Department of Mathematics and Statistics, Dept. 3036, 1000 E. University Ave., Laramie, WY 82071. Some remarks on the nearest neighbor graph in a Q-polynomial (cometric) association scheme. Preliminary report.

Let (X, \mathcal{R}) be a symmetric *d*-class association scheme which is *Q*-polynomial (cometric) with respect to the ordering E_0, E_1, \ldots, E_d of its primitive idempotents. Order the entries of $|X|E_1$ in decreasing order as $Q_{01} > Q_{11} > \cdots > Q_{d1}$ and consider the graph $\Gamma = (X, R_1)$ determined by the basis relation with adjacency matrix A_1 (so that $A_1 \circ E_1 = \frac{Q_{11}}{|X|}A_1$). We study the combinatorics of Γ .

We prove that Γ has d+1 distinct eigenvalues and provide bounds on both its diameter and its valency. In particular, we apply Terwilliger's balanced set condition, together with a result of Kodalen and Martin, to prove that the rank of E_1 is bounded above by the sum of valencies $v_1 + v_i$ for any i > 1 with intersection number $p_{11}^i > 0$ where A_i has constant row sum v_i . We then explore extremal cases for some of the inequalities derived. (Received July 31, 2018)