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An infinite family of linked strongly regular graphs realized through fusions of H(n,2)

We describe a set of seven strongly regular graphs, linked by Seidel switching and decomposition. This group of seven (sorry) is part of an infinite family of such, examples of which are obtained by means of the symplectic and orthogonal graphs over GF(2). The same graphs arise through fusions of the binary Hamming scheme $H(n, 2)$ which were characterized by Muzichuk. The two of interest here are $F_1 : [0][1, 2, 5, 6, \ldots][3, 4, 7, 8, \ldots]$ and $F_2 : [0][1, 4, 5, 8, \ldots][2, 3, 6, 7, \ldots]$ where the notation presumes the standard distance-regular ordering of relations. We denote the two SRGs obtained in this way (along with their complements) Γ^+ and Γ^-. We find that F_1 produces Γ^+ when n is congruent to 0 or 2 modulo 8, and Γ^- when n is congruent to 4 or 6. Similarly, F_2 produces Γ^+ or Γ^- depending on n modulo 8. We establish existence of certain cocliques in these graphs from which a Hamming scheme may be constructed, thereby providing an explicit fission of Γ^ϵ into $H(n, 2)$. Thus we have a combinatorial proof that these fusions exist for all even n, and a geometric understanding of the resulting graphs. Joint work with Caroline Vanicek.