Difference equations and the spectra of a family of strongly regular graphs

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Abstract

Let n be a natural number and $m = \lceil \frac{n}{2} \rceil + 1$. From a particular element in a basis B $= \{A_1, \cdots, A_m\}$ (where $A_1 = I_n$ is the identity matrix of order n) of an Euclidean Jordan algebra $\mathcal{V}_n$, with as many different eigenvalues as the dimension of the algebra, see [1], another basis B$'$ of idempotents is obtained by exploiting the algebraic and combinatorial properties of $\mathcal{V}_n$. From B$'$, we get easily the character table of $\mathcal{V}_n$. Then fusing all the matrices of B but A_1 and A_m, a strongly regular graph τ_1 is obtained when n is even. Additionally, for particular even values of n, other strongly regular graphs included in the Euclidean Jordan algebra $\mathcal{V}_n$ are obtained. Finally using m homogeneous linear difference equations of order two the spectra of the strongly regular graph τ_1 is determined.

Keywords:graph theory ;difference equations;

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