

Strongly regular signed graphs and association schemes

Ivana Jovović

School of Electrical Engineering, University of Belgrade

`ivana@etf.rs`

Tamara Koledin

School of Electrical Engineering, University of Belgrade

`tamara@etf.rs`

Zoran Stanić

Faculty of Mathematics, University of Belgrade

`zstanic@math.rs`

We consider relations between strongly regular signed graphs and symmetric association schemes. Our results include constructions of new examples of such signed graphs, relations between their structure and spectra, and their classifications.

We also propose definitions of Johnson signed graphs and Hamming signed graphs that arise from Johnson and Hamming schemes and act as the ‘signed’ counterparts to the well-known Johnson and Hamming graphs. We compute the eigenvalues of these signed graphs and provide necessary and sufficient conditions for their strong regularity. We also provide some results concerning strongly regular signed graphs that naturally arise from Johnson and Hamming schemes and have a comparatively small number of eigenvalues. Some constructions of strongly regular Johnson and Hamming signed graphs with at most five eigenvalues are provided.