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*Simple eigenvalues of vertex-transitive graphs and digraphs*

A simple eigenvalue of a graph is an eigenvalue of the adjacency matrix with multiplicity 1. For graphs, there is a general pattern that having many simple eigenvalues tends to coincide with having small automorphism groups. The only vertex-transitive graph with all simple eigenvalues is  $K_2$ . In the case of digraphs, however, there are non-trivial vertex-transitive examples with all simple eigenvalues and we investigate such digraphs. In particular, a digraph with all simple eigenvalues is a DRR with an Abelian automorphism group. We will also look at properties of vertex-transitive graphs with many simple eigenvalues.