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On Orders of Vertex-stabilizers in Arc-transitive Graphs

One of the central questions in the study of graphs admitting a certain degree of symmetry is determining how large their automorphism groups can be. For graphs of fixed valency, this is equivalent with determining possible orders of vertex-stabilizers. The famous Tutte's result from 1948 implies that vertex stabilizer of a cubic arc-transitive graph can have order at most 48. Arc-transitive graphs of the same valency can have different local actions, hence the orders of vertex-stabilizers depend not only on valency but also on the local actions. Poto\v cnik, Spiga and Verret in 2014 characterized possible orders of vertex-stabilizers in arc-transitive graphs of valency at most 7 for all possible local actions, except for three 6-valent cases.

In this talk we prove that in these three remaining cases the order of vertex-stabilizers can be exponentially large (as a function of the number of vertices). For proving this we will use cubic-arc-transitive graphs with large eigenspaces.

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