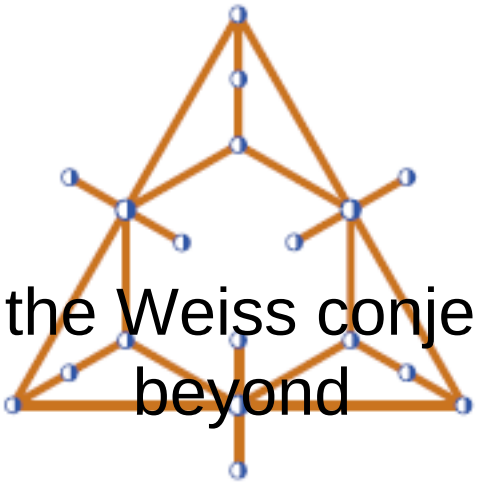
Bled'11 - 7th Slovenian International Conference on Graph Theory



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Towards the Weiss conjecture and beyond

Content :

Throughout this abstract, let Γ denote a finite connected G-arc-transitive graph, let G_v be the stabiliser of a vertex v, and let $G_v^{\Gamma(v)}$ be the permutation group induced by the action of G_v on the neighbourhood $\Gamma(v)$.

If the valence of Γ is 3, then a celebrated theorem of Tutte states that the order of G_v is bounded above by 48. Motivated by this surprising result, let us call a transitive permutation group L {\em graph-restrictive} if there exists a constant $c(L)$ such that whenever $G_v^{\Gamma(v)}$ is permutation isomorphic to L, it follows that the order of G_v is at most $c(L)$. In this terminology, Tutte's result states that both transitive permutation groups of degree 3 are graph-restrictive.

Following Tutte, several classes of permutation groups have been proved and some other classes have been conjectured to be graph-restrictive. However, no attempts have been made to characterise the class of graph-restricitive groups.

Such a characterisation will be addressed in a series of three talks by Pablo Spiga, Gabriel Verret and myself. Several new results will be presented, including the proof of ``left to right'' direction of the following conjecture:
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{\bf Conjecture} A transitive permutation group L is graphs restrictive if and only if it is semiprimitive (that is, if and only if every normal subgroup of L is either transitive
or semiregular).
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This conjecture generalises several well-known conjectures, for example, a conjecture of Richard Weiss which claims that
every primitive permutation group is graph-restrictive, as well as a conjecture by Cheryl Praeger which claims the same for the class of quasiprimitive groups.

This is joint work with Pablo Spiga and Gabriel Verret.

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