

All generalized Tutte-orientations and \mathcal{Z}_3 -connectivity

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Abstract

The concept of *all generalized Tutte-orientations* was introduced by Barát and Thomassen (JGT, 2006) for the study of claw-decompositions of graphs. The concept of group connectivity was introduced by Jaeger, Linial, Payan and Tarsi (JCTB, 1992) for the study of integer flows.

We prove that a graph G is \mathcal{Z}_3 -connected if and only if G admits all generalized Tutte-orientations. As a corollary, we further show that every 5-edge connected planar graph admits all generalized Tutte-orientations and thus it has a claw-decomposition if its edge size is divisible by 3. A result about all generalized Tutte-orientations by Barát and Thomassen's for the family of graphs with triangulations on some surfaces is also generalized to a larger family of graphs (without the restriction of embedding). As a byproduct, we construct a family of counterexamples to the conjecture proposed by Barát and Thomassen (JGT 2006) for claw decomposition of 4-edge-connected simple planar graphs. Note that this conjecture is recently disproved by other authors using theoretical method.