Flexibility of Embeddings on the Projective Plane

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Abstract: In 1933, Whitney showed that 'Whitney Twists' are sufficient to describe all of the flexibilities of embeddings of planar graphs. In particular, a 3-connected planar graph has a unique planar embedding. In 1996, Mohar, Robertson and Vitray described the operations for the flexibilities of planar graphs embedded in the projective plane. We present the operations needed to describe the flexibility of any graph on the projective plane. The result implies that 4-representative embeddings are unique and 3-representative graphs have at most 12 labelled projective embeddings. Finally, the result also has implications for the signed-graph matroid isomorphism problem.

This is joint work with Neil Robertson, Vaidy Sivaraman and Daniel Slilaty