Generating bricks

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Abstract. A brick is a 3-connected graph such that the graph obtained from it by deleting any two distinct vertices has a perfect matching. Bricks are building blocks of the matching decomposition procedure of Kotzig, Lovasz and Plummer, and therefore many matching-related problems can be reduced to bricks.

We prove, roughly, that every brick other than the Petersen graph can be generated from a "matching minor" of itself by repeatedly adding edges and "bisplitting" vertices. This implies the matching lattice theorem of Lovasz, and it settles Lovasz' conjecture that every minimal brick has a vertex of degree three. We apply the result in the study of graphs that admit Pfaffian orientations.

This is joint work with Serguei Norine, who will discuss applications of the result in his lecture.