Minimal bricks with the maximum number of edges

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Abstract

A 3-connected graph is a *brick* if, after the removal of any two distinct vertices, the resulting graph has a perfect matching. A brick is *minimal* if, for every edge e, deleting e results in a graph that is not a brick. Norine and Thomas (Minimal bricks, J. Combin. Theory, Ser. B, 96 (2006), 505-513) proved that every minimal brick with $2n$ vertices, which is distinct from the prism or the wheel on four, six or eight vertices, has at most $5n - 7$ edges. In this talk, we present the extremal minimal bricks with $2n$ vertices that meet this upper bound, and we prove that the number of extremal graphs equals $\lfloor (n-1)^2/4 \rfloor$ if $n \geq 6$, 5 if $n = 5$, 10 if $n = 4$ and 0 if $n = 1, 2, 3$, respectively. (Join work with Weigen Yan).

Keywords: matching covered graph; perfect matching; minimal brick

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