

Perfect-matching covers of cycle-injective graphs

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We introduce the concept of cycle-injective graphs and establish sufficient conditions for the existence of 4-perfect-matching cover in these graphs. A cycle-injective graph with a 4-perfect-matching cover is a confirming example to several long-standing open conjectures, including the Berge–Fulkerson conjecture, the cycle double cover conjecture, and the short cycle cover conjecture of Alon and Tarsi. Cycle-injective graphs are a natural generalisation of cycle-permutation graphs studied by Fouquet and Vanherpe in an unpublished 1994 manuscript. Using the new concept and linear algebra, we generalise their result. In particular, our main result is obtained by solving an associated system of linear inequalities. This is a joint work with Ján Karabáš, Edita Máčajová, Roman Nedela, Martin Škoviera.