GAME-PERFECT GRAPHS AND DIGRAPHS

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Strong and weak digraph colouring games are played on a digraph \( D \) with a given colour set \( C \). Two players, \( A \) and \( B \), take turns to colour an uncoloured vertex \( v \) as follows: in strong games, \( v \)'s colour must be distinct from its in-neighbours, while in weak games [4], colouring \( v \) may not create monochromatic directed cycles. \( A \) wins if all vertices are coloured in the end. Let \( g_X \) denote the game in which player \( X \) begins. Both variants of \( g_A \) generalize the graph colouring game [2]. The smallest \( |C| \) such that \( A \) has a winning strategy is called the game chromatic number of \( D \). The digraph \( D \) is game-perfect if the game chromatic number of any induced subdigraph \( H \) of \( D \) equals the (symmetric) clique number of \( H \). We characterize \( g_A \)-resp. \( g_B \)-perfect graphs by a set of 7 resp. 15 forbidden induced subgraphs [1, 3]. We reduce the characterization of weakly game-perfect digraphs to the undirected case and prove that strongly \( g_A \)-perfect digraphs have a kernel.

Keywords: game chromatic number, game-perfect (di)graph, kernel.

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References


