

The Distinguishing Index and Cost of Edge-distinguishing of Connected Graphs

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We say that an edge colouring c breaks an automorphism φ of a graph G if there exists an edge of G such that its colour is different from the colour of its image under φ . If a colouring breaks every non-trivial automorphism of the graph, then we call it a distinguishing colouring. Distinguishing index of a graph G , denoted by $D'(G)$, is the least number of colours in a distinguishing edge colouring. This parameter was first introduced by Kalinowski and Piłśniak in 2015 as an analogue to distinguishing vertex colourings, which have been studied earlier. For graphs with distinguishing index equal to two we consider an optimization problem such that we minimize the number of edges in one of the colour classes. The cost of edge-distinguishing of a graph G , denoted by $\rho'(G)$, is the least number of edges in one of the two colour classes of a distinguishing edge colouring of G .

During the talk we will present upper bounds for the distinguishing index of connected graphs that have been obtained and improved over the years. We will pay special attention to Cartesian products of connected graphs. Moreover, we will present some classes of graphs with distinguishing index equal to two, such as the hypercubes. For this classes of graphs we will present results on the cost of edge-distinguishing.

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