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Preprint Nr MD 076
(otrzymany dnia 1.03.2015)

Kraków
2015

Redaktorami serii preprintów Matematyka Dyskretna są:
Wit FORYŚ (Instytut Informatyki UJ)
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Edge Motion and the Distinguishing Index *

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Mathematics Subject Classifications: 05C25, 05C80, 03E10

Abstract

The *distinguishing index* $D'(G)$ of a graph G is the least number d such that G has an edge colouring with d colours that is only preserved by the trivial automorphism. We investigate the edge motion of a graph with respect to its automorphisms and compare it with the (vertex) motion. We prove an analog of the Motion Lemma of Russell and Sundaram [11], and we use it to determine the distinguishing index of the powers of complete graphs and of cycles with respect to the Cartesian, direct and strong products.

Keywords: symmetry breaking; distinguishing index; Motion Lemma; graph products.

1 Introduction

The *distinguishing index* $D'(G)$ of a graph G is the least number d such that G has a colouring with d colours that is only preserved by the trivial automorphism. This notion was introduced by Kalinowski and Pilśniak [8] as analogous of the well-known *distinguishing number* $D(G)$ of a graph G defined by Albertson and Collins [2] for vertex colourings. Obviously, the

*The research was partially supported by the Polish Ministry of Science and Higher Education.