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PREFACE

This event is a forum for mathematician and computer scientist for discussing and exchanging information and knowledge in their area of interest. It aims to promote activities in research, development and application not only on mathematics and computer sciences areas, but also all areas that are related to those two fields.
This proceeding contains sorted papers from the International Conference on Mathematical and Computer Sciences (ICMCS) 2013. ICMCS 2013 is the inaugural international event organized by Mathematics Department Faculty of Mathematics and Natural Sciences University of Padjadjaran, Indonesia.
In this proceeding, readers can find accepted papers that are organized into 3 track sections, based on research interests which cover (1) Mathematics, (2) Applied Mathematics, (3) Computer Sciences and Informatics.
We would like to express our gratitude to all of keynote and invited speakers:

- Prof. Dr. M. Ansjar (Indonesia)
- Assoc. Prof. Dr. Q. J. Khan (Oman)
- Prof. Dr. Ismail Bin Mohd (Malaysia)
- Prof. Dr. rer. nat. Dedi Rosadi (Indonesia)
- Prof. Dr. T. Basarudin (Indonesia)
- Assoc. Prof. Abdul Thalib Bin Bon (Malaysia)
- Prof. Dr. Asep K. Supriatna (Indonesia)

We also would like to express our gratitude to all technical committee members who have given their efforts to support this conference.
Finally, we would like to thank to all of the authors and participants of ICMCS 2013 for their contribution. We hope your next participation in the next ICMCS.

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KEYNOTE SPEAKER

Fractional Colorings in The Mycielski Graphs

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Abstract: In this paper, we will investigate the results of graph coloring by Michael Larsen, James Propp and Daniel Ullman 1995. Namely, "fractional chromatic number of Mycielski Graf," that the fractional clique number of a graph *G* bounded below by the number of clique integer, and it is equal to the fractional chromatic number, which is bounded above by the number of chromatic integer. In other words,

$$\omega(G) \leq \omega_F(G) = \chi_F(G) \leq \chi(G)$$

Given this relationship, giving rise to a question whether the difference $\omega_F(G) - \omega(G)$ and $\chi(G) - \chi_F(G)$ can be made arbitrary large. The question then will be proved in the affirmative, with the order of the graph to show the differences between them are increased without limit. Proof to determine the fractional coloring and the fractional chromatic number, will be shown in two different ways: first intuitively, combinatorial way marked in relation to with graph homomorphisms, and then in relation to with an independent set, with calculations using linear programming. In this second context, will be defined fractional clique, and see how this relates to fractional coloring. Relationship between coloring fractions and fractional clique is the key proof of Larsen, Propp, and Ullman.

Keywords: fractional clique number, fractional chromatic number, Mycielski Graf, linear programming.

1. Introduction

In this paper, we discuss a result about graph colorings from 1995. The paper we will be investigating is "The Fractional Chromatic Number of Mycielski's Graphs," by Michael Larsen, James Propp and Daniel Ullman [3].

We will begin with some preliminary definitions, examples, and results about graph colorings. Then we will define *fractional colorings* and the *fractional chromatic number*, which are the focus of Larsen, Propp and Ullman's paper. We will define fractional colorings in two different ways: first in a fairly intuitive, combinatorial manner that is characterized in terms of *graph homomorphisms*, and then in terms of independent sets, which as we shall see, lends itself to calculation by means of linear programming. In this second context, we shall also define *fractional cliques*, and see how they relate to fractional colorings. This connection between fractional colorings and fractional cliques is the key to Larsen, Propp and Ullman's proof.

2. Graphs and graph colorings

2.1 Basic definitions

A graph is defined as a set of vertices and a set of edges joining pairs of vertices. The precise definition of a graph varies from author to author; in this paper, we will consider only finite, simple graphs, and shall tailor our definition accordingly.

A graph *G* is an ordered pair ($V(G)$, $E(G)$), consisting of a vertex set, $V(G)$, and an edge set, $E(G)$. The vertex set can be any finite set, as we are considering only finite graphs. Since we are only considering simple graphs, and excluding loops and multiple edges, we can define $E(G)$ as a subset of the set of all *unordered* pairs of *distinct* elements of $V(G)$.