INTERNATIONAL CONFERENCE ON COMBINATORICS, CRYPTOGRAPHY AND COMPUTATION

Iran University of Science &Technology

Proceedings of the 2nd International Conference on Combinatorics, Cryptography and Computation (I4C2017)

Equi-2-Regular Graphs

Somayeh Khalashi Ghezelahmad
Department of Mathematics, Science and Research Branch, Islamic Azad University,
Daneshgah Blvd, Simon Bulivar Blvd, Tehran, Iran
s.ghezelahmad@srbiau.ac.ir

ABSTRACT

In this paper, we study graphs whose size of all maximal 2-regular subgraphs are the same. We call these graphs equi-2-regular. We characterize regular graphs which are equi-2-regular. We study claw-free equi-2-regular graphs. Moreover, a family of 2-connected equi-2-regular graphs is constructed.

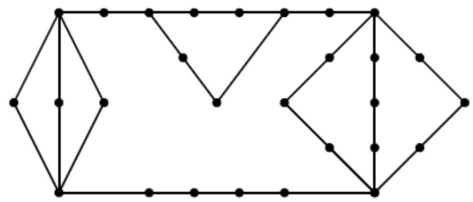
KEYWORDS: Claw-free, Equi-2-regular, Matching

1 INTRODUCTION

All graphs we consider are finite, simple and undirected. Let G be a graph. The minimum degree of G is denoted by $\delta(G)$. A graph G is called *equimatchable* if all maximal matchings in G, have the same size. For example $K_{n,n}$, where n is a positive integer, is an equimatchable graph. The concept of equimatchability was first considered by Meng [6], Lewin [5] and Grünbaum [2] in 1974. Since then, equimatchable graphs have been extensively studied by several authors. See for instance [1, 3, 4, 7].

Sumner [7], proved that a connected equimatchable graph has a 2-factor if and only if it is one of the graphs K_{2n} and $K_{n,n}$, where n is a positive integer. Favaron also proved that every equimatchable factor-critical 2-connected graph is Hamiltonian. Equimatchable 3-regular graphs are characterized in [3]. It is proved that the only connected 3-regular equimatchable graphs are K_4 or $K_{3,3}$.

In this paper, we intend to characterize all graphs whose size of all maximal 2-regular subgraphs are the same. We call these graphs *equi*-2-*regular*. For instance, the following graph is equi-2-regular and the size of its maximal 2-regular subgraphs is 18.



We study regular graphs which are equi-2-regular. We investigate claw-free equi-2-regular graphs. Furthermore, a family of 2-connected equi-2-regular graphs is constructed.

2 MAIN RESULTS

Theorem 2.1. Let r be a positive integer and G be an r-regular graph. Then G is not equi-2-regular.

Theorem 2.2. Let G be a connected claw-free graph which is not a cycle. If $\delta(G) \geq 3$, then G is not equi-2-regular.

REFERENCES

]١[. Favaron O. (1986). Equimatchable factor-critical graphs. J. Graph Theory, 10, 439-448.

[2]. Grünbaum, B. (1974). Matchings in polytopal graphs, Networks, 4 , 175–190.

[3]. Kawarabayashi K., Plummer M. D. and Saito A. (2003). On two equimatchable graph classes. Discrete Math., 266 263–274.

[4]. Lesk M., Plummer M. D. and Pulleyblank W. R. (1984). Equi-matchable graphs, Graph Theory and Combinatorics, Proc. Cambridge Combinatorial Conference in Honour of Paul Erdos. B. Bollob´as, (editor), Academic Press, London , 239–254.

[5]. Lewin M. (1974). Matching-perfect and cover-perfect graphs. Israel J. Math., 18 345–347.

[6]. Meng D. H.-C. 1974. Matchings and coverings for graphs. PhD thesis, Michigan State University, East Lansing, MI.

[7]. Sumner D. P. (1979). Randomly matchable graphs, J. Graph Theory, 3 183-186.