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On 2-power unicyclic cubic graphs

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Abstract

In a graph, a cycle whose length is a power of two (that is, 2^k) is called a 2-power cycle. In this paper, we show that the existence of an infinite family of cubic graphs which contain only one cycle whose length is a power of 2. Such graphs are called as 2-power unicyclic cubic graphs. Further we observe that the only 2-power cycle in a cubic graph cannot be removed implying that there does not exist a counter example for Erdős-Gyárfás conjecture.

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1. Introduction

In a graph G, a 2-power cycle is a cycle whose length is a power of 2. A graph which contains a unique 2-power cycle is called a 2-power unicyclic graph. In 1995, Erdős and Gyárfás [4] put forward a conjecture which states that every graph with minimum degree 3 contains a simple cycle whose length is a power of two. If the conjecture is false, a counter example would take the form of a graph with minimum degree three having no cycles whose length is a power of two. It is known through computer searches of Gordon Royle and Klas Markstrom that any counterexample must have at least 17 vertices, and any cubic counter example must have at least 30 vertices. Markstrom's searches found four graphs on 24 vertices in which the only power-of-two cycles have 16 vertices, one of these four graphs is planar. However, the Erdős-Gyárfás conjecture is now known to be true

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