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Independence Number of Fullerene Graph

M. Faghani
Payame Noor University (PNU)

S. Firouzian*
Payame Noor University (PNU)

M. NouriJouybari
Payame Noor University (PNU)

Abstract

A set $S \subseteq V(G)$ is independent if no two vertices from S are adjacent. The cardinality of any biggest independent set in $V(G)$ is called the independence number of G and denoted by $\alpha(G)$. In this paper, we compute independence number of infinite classes of fullerene graphs.

Keywords: Independent set, Independent number, Fullerene
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1 Introduction

We talk about one of the graph invariants. An independent set in a graph G is a set of vertices of G that are pairwise non-adjacent, and the independence number, $\alpha(G)$, is the order of the maximum independent set of G. Finding such a set is an NP-hard problem. In next section we discuss about independent number of special graph.
One of most important nano structures are Fullerenes. The discovery of the fullerene C_{60} by Kroto et al. in 1985. [7]. They are a trivalent plane graph with r -gon or s-gon faces. Values of r can be 3,4,5 and for s can be 6 so we named them as $[r, s]$-Fullerenes. The familiar of them are (5,6), (4,6) and (3,6) Fullerenes. It follows from Eulers formula that such graphs made up entirely of n vertices and having 12 pentagonal and $\frac{n}{2} - 10$ hexagonal rings. These graph theoretic fullerenes are simulated to model large carbon molecules, each vertex represents a carbon atom and the edges represent chemical bonds. Since a carbon atom has chemical valence 4, one edge at each of the graphs must represent a double chemical bond.
In [5] P.W. Fowler and et al. survey the independence numbers of fullerenes from C_{20} to C_{120}, a range that includes over 10 million isomers, Contrary to a literature proposal, stability and minimal independence number of fullerenes are poorly correlated.
In [2] T. Doslic present both upper and lower bound for independent number of fullerene graph. In this paper, we discuss independent number of (3,6)-fullerene graph with $4n$ and $8n$ vertices.

*Speaker