

# Enumerating Perfect Matchings in a Ring of Diamonds

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## Abstract

This paper presents an algorithm for enumerating all possible perfect matchings in a ring of diamonds – a connected claw-free cubic graph in which every vertex is in a diamond. A perfect matching in a graph refers to a collection of disjoint edges (a matching) in which every vertex of the graph is incident to exactly one edge of the matching, that is, it covers all vertices of the given graph. Our algorithm is based on Sang-il Oum's (2011) work on perfect matchings of claw-free cubic graphs. In addition, we give a proof by mathematical induction to show that there are exactly  $2n + 1$  perfect matchings in a ring of  $n$  diamonds – a result stated in Sang-il Oum's (2011) paper, but not explicitly proven. Finally, we present a pseudocode of our numerical scheme and some computational examples. In particular, we implement the algorithm using the Fortran programming language and plot the results using a command-line Gnuplot program.

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## Introduction