

# An Algorithm for Finding Disjoint Paths in the Alternating Group Graph, Part 1

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## Abstract

For the purpose of large scale computing, we are interested in linking computers into large interconnection networks. In order for these networks to be useful, the underlying graph must possess desirable properties such as a large number of vertices, high connectivity, and small diameter. Suppose we have  $k$  pairs of vertices  $(s_1, t_1), (s_2, t_2), \dots, (s_k, t_k)$  and wish to find  $k$  disjoint paths; each path connecting exactly one pair. If in a graph  $G$  we can do this for any  $k$  pairs of vertices then we say that  $G$  has the  $k$ -disjoint path property. In 2005, Cheng, Kikas, and Kruk showed that the Alternating Group Graph  $A_n$  has the  $(n - 2)$ -disjoint path property. Their proof was, however, an existence proof. They did not show how one may construct the disjoint paths. In this paper, we present an algorithm that actually constructs the disjoint paths from scratch. The algorithm is algebraic. We close with a discussion of possible research stemming from this work.