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A new parallel algorithm to solve one classic water resources optimal allocation problem based on inspired computational model

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ABSTRACT

The shortage of freshwater resources is a serious problem in the process of urbanization in the world, and even become the main constraint factor in some areas. In order to solve the problem, it is imperative to develop an effective, flexible and low-cost water resources management plan. Water resources optimal allocation is one of the hot topics in the field of water resources at present, such as water resources optimal *k*-edge cover problem. The *k*-edge cover problem aims to find an edge cover set with *k* edges in a given undirected graph. The efficient solution of this problem can play an important role in planning and setting up urban water resources network sites. Based on DNA molecular computing, the paper use a new parallel algorithm to solve *k*-edge cover problem with $O(n^2)$ time complexity, which greatly simplifies the computing complexity.

Keywords: DNA computation; Water resources optimal allocation problem; The *k*-edge cover problem; Adleman-Lipton model; NP-complete problem

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