ASYMPTOTICALLY OPTIMAL APPROACH TO THE APPROXIMATE SOLUTION OF SEVERAL PROBLEMS OF COVERING A GRAPH BY NONADJACENT CYCLES

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We consider the m-Cycle Cover Problem, which consists in covering a complete undirected graph by m vertex-nonadjacent cycles with extremal total edge weight. The so-called TSP approach to the construction of an approximate algorithm for this problem with the use of a solution of the traveling salesman problem (TSP) is presented. Modifications of the algorithm for the problems Euclidean Max m-Cycle Cover with deterministic instances (edge weights) in a multidimensional Euclidean space and Random Min m-Cycle Cover with random instances $UNI(0,1)$ are analyzed. It is shown that both algorithms have time complexity $\mathcal{O}(n^3)$ and are asymptotically optimal for the number of covering cycles $m = o(n)$ and $m \leqslant \frac{n^{1/3}}{\ln n}$, respectively.

Keywords: cycle cover of a graph, Traveling Salesman Problem, approximation algorithms, time complexity, approximation ratio, asymptotic optimality, random instances, probabilistic analysis.

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