Abstract:
Navigation channels are fairways for vessels to travel in and out of the terminal basin of a container port. The capacity of a navigation channel is restricted by the number of traffic lanes and safety clearance of vessels, and the availability of a navigation channel is usually affected by tides. The limited capacity and availability of a navigation channel can lead to congestion in the terminal basin. When the navigation channels run out of capacity, the anchorage areas in the terminal basin can serve as a buffer. This paper aims to develop a mathematical model which simultaneously optimizes the navigation channel traffic and anchorage area utilization. We provide a mixed integer programming formulation of the problem, analyze its complexity, and propose a Lagrangian relaxation heuristic in which the relaxed problem is decomposable into two asymmetric assignment problems. Computational performance of the Lagrangian relaxation heuristic is tested on problem instances generated based on the operational data of a port in Shanghai. Computational results show that the proposed heuristic is able to achieve satisfactory performance within reasonable computation time.

Bio:
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