

Energy-efficient Train Scheduling Problem with Dynamic Passenger Demands

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Abstract: By employing a space-time network representation, this paper proposes a linear mixed integer programming model for energy-efficient metro train scheduling problem with dynamic passenger demands. Due to the computational complexity of this model, especially for large-scale real-world instances, we develop a Lagrangian relaxation (LR)-based heuristic algorithm that decomposes the primal problem into two sets of subproblems and thus enables to find a good solution in short computational time. Finally, two sets of numerical experiments, involving a relatively small-scale case and a real-world instance based on the operation data of Beijing metro are implemented to verify the effectiveness of the proposed approaches.

Keywords: Train scheduling problem, energy efficiency, space-time network, dynamic passenger demands