Accepted Manuscript

A Combined Column Generation and Heuristics for Railway Short-term Rolling Stock Planning with Regular Inspection Constraints

Tatsushi Nishi, Akiyoshi Ohno, Masahiro Inuiguchi, Satoru Takahashi, Kenji Ueda

PII: S0305-0548(16)30299-4
DOI: 10.1016/j.cor.2016.11.025
Reference: CAOR 4138

To appear in: *Computers and Operations Research*

Received date: 4 January 2013
Revised date: 5 April 2016
Accepted date: 26 November 2016

Please cite this article as: Tatsushi Nishi, Akiyoshi Ohno, Masahiro Inuiguchi, Satoru Takahashi, Kenji Ueda, A Combined Column Generation and Heuristics for Railway Short-term Rolling Stock Planning with Regular Inspection Constraints, *Computers and Operations Research* (2016), doi: 10.1016/j.cor.2016.11.025

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

A Column Generation and Lagrangian Relaxation with Heuristics for Railway Short-term Rolling Stock Planning with Regular Inspection Constraints

Tatsushi Nishi [a], Akiyoshi Ohno [a], Masahiro Inuiguchi [a], Satoru Takahashi [b], Kenji Ueda [b]

[a] *Division of Mathematical Science for Social Systems, Department of Systems Innovation, Graduate School of Engineering Science, Osaka University, 1-3 Machikaneyama, Toyonaka city, Osaka 560-8531, Japan*

[b] *Advanced Technology R&D Center, Mitsubishi Electric Corporation, 8-1-1 Tsukaguchi-honmachi, Amagasaki, Hyogo 661-8661, Japan*

Abstract

The aim of railway rolling stock planning problem is to find an optimal allocation of train-sets for a given set of trips in the train timetable in order to minimize the total cost. We propose a column generation and Lagrangian relaxation heuristics for short-term rolling stock planning problems with regular inspection constraints. The problem is formulated as a subtour traveling salesman problem to find a set of elementary shortest cycles that cover all trips in the timetable. In the proposed method, a tight lower bound is obtained from the continuous relaxation of Dantzig-Wolfe reformulation by column generation. The pricing problem can be formulated as an elementary shortest cycle problem with resource constraints. A labeling algorithm is applied to solve the pricing problem. In order to reduce the computational effort, we apply a general state space augmenting algorithm to solve the pricing problems. Computational results show that the proposed column generation and Lagrangian relaxation heuristics can find good lower and upper bounds for 300 trips within reasonable computing time.

Key words: combinatorial optimization, scheduling, rolling stock planning, column generation, set partitioning problem, Lagrangian relaxation, heuristics

ACCEPTED MANUSCRIPT

Download English Version:

https://daneshyari.com/en/article/4959057

Download Persian Version:

https://daneshyari.com/article/4959057

Daneshyari.com