WORKING PAPER

Tank allocation for liquid bulk vessels using a hybrid constraint programming approach

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ABSTRACT

This paper considers the allocation of cargoes to tanks for the specific case of chemical liquid bulk vessels. No articles in the literature and no commercial software packages are available that can handle the multitude of side constraints that need to be considered. These constraints include segregation constraints for the chemicals on the one hand, to prevent chemicals from being loaded into certain types of tanks or next to other chemicals in adjacent tanks. On the other hand, the constraints include vessel stability considerations, which limit the volumes with which the tanks are loaded. A hybrid CP-LP model is presented in this paper, in which constraint programming (CP) is used to determine possible cargo-to-tank allocations, after which linear programming (LP) is used to generate actual loading plans that optimize the vessel stability. The validity and practical usefulness of this model are shown by solving real-life instances.

KEYWORDS: Tank allocation problem, Constraint programming, Chemical tankers, Load planning.