Robust Solutions to Storage Loading Problems under Uncertainty

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Abstract: We consider storage loading problems under uncertainty where the storage area is organized in fixed stacks with a limited height. Such problems appear in several practical applications, e.g., when loading container terminals, container ships or warehouses. Incoming items arriving at a partly filled storage area have to be assigned to stacks under the restriction that not every item may be stacked on top of every other item and taking into account that some items with uncertain data will arrive later. Following the robust optimization paradigm, we propose different MIP formulations for the strictly and adjustable robust counterparts of the uncertain problem. Furthermore, we show that in the case of interval uncertainties the computational effort to find adjustable robust solutions can be reduced. Computational results are presented for randomly generated instances with up to 480 items. The results show that instances of this size can be solved in reasonable time and that including robustness improves solutions where uncertainty is not taken into account.

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