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A novel MIP formulation for the optimization problem of maintenance planning of military aircraft

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Abstract

A Flight and Maintenance Planning problem is considered for military aircraft. A novel Mixed-Integer Linear Programming model is developed for scheduling maintenance operations along with the assignment of regular, pre-scheduled, missions. This model takes into account the specific requirements of a military environment and its operational goals. On the contrary to previous studies, the developed model is applicable for the management of a heterogenic fleet. Different combinations of objective functions are discussed for multi-objective optimization and the impact of their use is analyzed on a dataset provided by French Army Forces. The complexity of the obtained problem formulations is studied; new procedures are developed in order to decrease the computational time required to construct efficient Pareto-fronts of alternative solutions for real-life sized instances. The results obtained in computational tests show the efficiency of the developed optimization approach.

Keywords: optimization; Flight and Maintenance Planning; aircraft maintenance; Mixed Integer Programming.