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散点状分布危险天气区域下的航班改航路径规划

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Flight Rerouting Path Planning in Dispersedly Distributed Severe Weather Areas

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摘要 参考文献 相关文章

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摘要 针对沿航线散点状分布的危险天气区域影响下的航班改航问题，提出了基于多目标遗传算法(MOGA)的航班改航路径规划方法。首先建立了基于网格的改航环境模型，并给出散点状分布危险天气区域的描述方法。然后以改航航段的航段距离、平均偏离距离和转弯点个数为目标，应用带精英保留策略的非支配排序遗传算法(NSGA-II)对改航路径规划进行研究，提出了适用于改航路径规划的编码方法，同时引入了删除算子。最后，以昆明—广州航线为例，研究了散点状分布危险天气区域下的改航路径规划，并与基于多边形的改航路径规划算法作了比较。仿真结果表明：采用本文方法运行一次即可得到多条安全、可行的改航路径，且无需先验知识，为决策者选择改航路径提供了充足的依据。

关键词： 空中交通管制 遗传算法 NSGA-II 改航 路径规划

Abstract： In order to cope with the flight rerouting problem caused by dispersedly distributed severe weather areas along the flight path, a new rerouting path planning method based on the multi-objective genetic algorithm (MOGA) is proposed. First, a grid-based environment model of the air traffic rerouting problem is constructed, and a method to describe dispersedly distributed severe weather areas is given. Then non-dominated sorting genetic algorithm II (NSGA-II) is applied to the flight rerouting problem, which takes into consideration the distance, number of turns and deflection of the flight rerouting path. Furthermore, a new coding method and the deletion operator are applied. Finally, the flight rerouting paths of Kunming-Guangzhou with disper-sedly distributed severe weather areas are studied, and compared with the rerouting method based on the polygon algorithm. Simulation results show that each time the proposed method can find a set of safe and feasible flight rerouting paths without prior information, from which decision-makers can select the most appropriate one.

Keywords： air traffic control genetic algorithms non-dominated sorting genetic algorithm II rerouting path planning

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