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敏捷性管理系统优化设计

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DESIGN COMBAT AGILITY MANAGEMENT SYSTEM WITH OPTIMAL CONTROL THEORY

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摘要 为了充分发挥战斗机敏捷性管理系统增强飞机作战能力的作用,利用最优控制的研究成果——直接多重打靶法,在通过仅假设出节点处的控制变量值以改进原算法之后,对敏捷性管理系统进行了优化设计。结果表明,因所对应的非线性规划问题维数降低很多,改进算法能更快、更有效地求解一类受约束最优控制问题;通过最优设计,使得敏捷性管理系统在确保满足各种约束条件的前提下,飞机的转弯时间缩短了近 ２０％

关键词： 敏捷性管理系统　最优控制　直接多重打靶法　非线性规划　序列二次规划

Abstract： A combat agility management system(CAMS) is designed with the optimal control theory so that it can play a more important role in enforcing an aircraft's ability in a close combat condition. At the same time, a multiple shooting algorithm for direct solution of optimal control problems is improved by only giving the control variable's values at the knots. The study results show that some optimal control problems with constraints can be solved more quickly and efficiently with the improved algorithm because the dimensions of the non linear programming problem deduced from an optimal control problem are cut down very much; CAMS designed with the optimal control theory can decrease an aircraft's turning time by 20% approximately.

Keywords： combat ag ility manag ement sy stem　optimal contr ol　direct mult iple sho ot ing algo rit hm　no n- linearpr og ramming　sequential quadr ic pro gr amming

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