系统工程与电子技术 2010, 32(4) 833-836 DOI: ISSN: 1004-4132 CN: 11-3018/N

控制理论与实践

智能决策系统及其在飞控系统设计中的应用

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摘要：

为使飞控系统的设计更加省时省力，将智能决策支持系统引入到飞控系统中。通过智能决策系统来管理飞机的数据库、模型库、控制方法等，并在知识库中应用智能算法来决策飞机的最优控制规律。在智能决策算法的开发中，采用基于踏脚石迁移模型的分布式遗传算法，将种群划分为若干子群，各子群并行地进行遗传进化，并通过迁移算子进行各子群的信息互换；在编码过程中，采用伪码与实码相互转换的编码方式，大大减少了编码的工作量。仿真结果表明，基于踏脚石迁移模型的分布式遗传决策算法能快速并有效地应用于控制系统设计中。

关键词： 飞控系统 智能决策 分布式遗传算法 迁移 伪码

Intelligent decision support system and its application in design of flight control systems

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Abstract:

To decrease the design workload and shorten the computing time, the intelligent decision support system (IDSS) is used in the flight control system to manage the database, model base, control methods and choose the optimal control law for the aircraft by using the intelligent algorithm in the knowledge-base.The distributed genetic algorithm (DGA) based on the stepping-stone transfer model is used in the development of the intelligent decision algorithm to divide the original population into several subgroups which can parallel inherit and evolve, and the subgroups can exchange each other’s information by the transfer operators. To decrease the coding workload, an encode mode, in which the pseudo code and true code are mutually transformed, is used in the coding process. Simulation results show the validness and efficiency of the intelligent decision support system which uses the distributed genetic decision algorithm in the design of flight control systems.

Keywords: flight control system intelligent decision distributed genetic algorithm transference pseudo code

收稿日期 修回日期 网络版发布日期

DOI:

基金项目:

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本刊中的类似文章

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