

制导、导航与控制

基于鲁棒自适应控制理论的导弹纵向逆控制

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摘要:

针对高机动导弹纵向运动数学模型具有严重非线性、不稳定、多变量耦合以及模型不确定等特点, 提出了一种基于鲁棒自适应控制理论和动态逆相结合的导弹纵向控制系统设计方法。该方法以非线性动态逆控制为基本控制律, 能够在复杂的飞行条件下, 实现对高机动导弹的精确线性化, 解除了多变量之间的耦合关系; 并引入鲁棒自适应控制律, 以抑制模型参数变化的摄动和外部干扰的影响, 保证了导弹的纵向稳定性及其纵向飞行品质。仿真分析验证了控制方法的有效性。

关键词: 高机动导弹 纵向飞行控制 动态逆控制 鲁棒自适应控制

Longitudinal dynamic inversion control for missiles based on robust adaptive control theory

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Abstract:

For the problem that the longitudinal motion model of high maneuver missiles is highly nonlinear, unstable, multivariable coupled and includes model uncertainty. A novel control system design method for missiles based on dynamic inverse and robust adaptive control is presented. The basic control law is designed by dynamic inversion control, which can make coupled multivariable relations relieved by accurately linearization of the high maneuver missiles in complicated flight condition, then a robust adaptive control law is introduced to restrain the effects of model parameters perturbation and external disturbances. And it can provide the longitudinal stability and improve longitudinal flight quality for high maneuver missiles. Finally, simulation analysis shows the effectiveness of the control method.

Keywords: high maneuver missile longitudinal flight control dynamic inverse control robust adaptive control

收稿日期 修回日期 网络版发布日期

DOI: 10.3969/j.issn.1001-506X.2011.02.26

基金项目:

通讯作者:

作者简介:

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