

工程与应用

一类非线性不确定系统的自适应积分滑模控制

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摘要 针对一类具有不确定参数的复杂非线性系统, 提出了一种自适应积分滑模控制方法。控制器的设计分两步进行: 首先, 基于被控对象模型构造一个简化子系统, 设计出该子系统的—个全局渐近稳定控制律; 然后构造—个积分滑模面, 设计自适应积分滑模补偿器以处理系统中含有不确定参数的部分, 保证了滑模面的可达性和原系统的闭环稳定性。补偿后, 系统的完整自适应控制律由简化子系统的控制律加补偿控制器两部分组成。所提设计方法简单, 便于工程实现。最后, 通过仿真结果验证了设计方案的有效性。

关键词 [非线性系统](#) [自适应控制](#) [积分滑模](#) [不确定系统](#)

分类号

Nonlinear adaptive integral sliding mode control

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Abstract

A new adaptive integral sliding mode controller is proposed for a class of nonlinear systems with uncertainties. The control law is composed of two parts: a controller for the reduced model of the plant and a compensator. Consequently, the design is also divided into two steps. Firstly, a globally asymptotically stable controller is developed based on a reduced model of the plant. Then, an integral sliding mode surface is constructed in order to treat those parts relating to the uncertain parameters, and an adaptive integral sliding mode compensator is developed to ensure the reachability of the sliding mode surface and the stability of the original system. The design is simple and the control law is very concise, so it is suit for practical implementation. The result of simulation verifies the efficiency of the suggested design.

Key words [nonlinear systems](#) [adaptive control](#) [integral sliding mode](#) [uncertain systems](#)

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