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## 基于平方和优化的飞行器大角度机动LPV 控制器设计

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Title: The Design of LPV Controller for Spacecraft's Wide Angle Maneuver Based on Square Sum Optimization

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关键词: [LPV模型](#); [平方和优化](#); [大角度机动](#); [Lyapunov函数](#); [控制器设计](#)

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摘要: 采用修正的Rodrigues参数(MRP)建立了飞行器姿态控制的数学模型,将非线性的飞行器姿态控制系统模型转化为线性参数可变模型(LP<sub>V</sub>模型),避免了四元数法带来的复杂计算量。针对Lyapunov函数 $V=x^T P(x)x$ 中含有多项式参数矩阵 $P(x)$ 的非线性系统,提出了一套利用平方和优化技术和Lyapunov理论进行正定判定的方案和镇定控制器设计方法。仿真结果表明,设计方法有效解决了此类系统控制器设计问题,控制器具有较快的响应速度和较好的稳定性。

Abstract: In this paper, the modified Rodrigues parameter(MRP) was used to replace the quaternion to set up the mathematic model of spacecraft attitude control system, then the nonlinear spacecraft attitude system model was transformed into the line parameter variable model(the LP<sub>V</sub> model). For the nonlinear system that its Lyapunov function( $V=x^T P(x)x$ ) includes polynomial matrix  $P(x)$ , a new approach for LPV controller design was developed based on square sum optimization and the Lyapunov theories. An example was provided to demonstrate effectiveness of the new approach.

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