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短文

具有马氏跳跃参数的切削加工系统控制问题研究

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摘要
以单刀具垂直切削加工系统为研究对象, 引入了变进给量控制方法, 建立了具有Markov跳跃参数的时变时滞跳跃系统模型. 通过对系统的随机稳定性分析, 给出了使系统呈均方意义下指数稳定的充分条件, 同时研究了在系统参数矩阵和状态转移率非精确可知情形下的鲁棒稳定性条件, 并讨论了时变时滞参数对系统状态变量指数衰减速率的影响关系. 最后以仿真算例说明了本文所提方案的有效性.

关键词 单刀具垂直切削 Markov跳跃系统 时变时滞 均方指数稳定

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Control of Cutting Systems with Markovian Jump Parameters

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Abstract
This paper is concerned with exponential stability of a single-tool orthogonal cutting system, which is modelled as a Markovian jump system with time-varying delay. A new method using varying feed rate control is presented. Sufficient conditions for exponential stability in the mean square sense are obtained using the Lyapunov-Krasovskii functional (LKF) method. Furthermore, a robust stochastic stability criterion is established for the discussed system, in which the system matrices and the mode transition rate are partially known. The effects of delay parameters on the exponential convergence rate of the system states are also discussed. An illustrative numerical example is provided to demonstrate the effectiveness of the proposed approach.

Key words Single-tool orthogonal cutting Markovian jump system time-varying delay exponential stability in the mean square sense

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