

控制科学与工程

基于离散趋近律的变结构系统控制

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摘要:

探讨了离散线性系统的变结构控制问题,分析了传统趋近律方法的缺陷,提出了一种新的离散变结构趋近律。该趋近律不但能使系统滑模轨迹渐进收敛于零,而且其确定的准滑动模态区在趋近过程中能够分成为两个区域。分析了滑模轨迹在两个区域内的不同趋近特性,通过调整参数改变两个区域的宽度,尽量减少滑模轨迹穿越切换面的次数,确保系统的抖振削弱和鲁棒性。仿真结果证明,该离散趋近律方法对离散线性确定系统和离散不确定性系统都有良好的控制效果。

关键词: 离散变结构控制 抖振削弱 鲁棒性 离散趋近律

Discrete variable control systems based on a discrete reaching law

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Abstract:

The problem of variable control for discrete-linear systems was discussed. A new discrete reaching law was presented to deal with the flaw which exists in the conventional variable structure reaching law method. The sliding mode determined by this reaching law could be divided into two areas in the reaching process and the sliding mode trajectory could be converged to zero. The different reaching characteristics of the sliding mode trajectory were considered. The width of two areas might be changed by the adjustment of control parameters so that it enabled the sliding mode trajectory to pass through the switch surface as little as possible, thus the guarantee of control system chattering weakening and robustness was achieved. Good robustness of the discrete variable controller designed by this reaching law was proved. The simulation results showed the superiority of this discrete reaching law method for nominal systems and good control performance for uncertain systems.

Keywords: discrete variable control chattering weakening robustness discrete reaching law

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