

论文

高速移动平台横向运动自抗扰控制研究

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摘要:

采用自抗扰控制(ADRC)方法,对高速轮式车辆和机器人等移动平台的横向运动控制技术进行了研究.首先给出带约束的平台横向运动数学模型,对ADRC进行简要介绍;然后将模型变换为两个仿射型的子系统模型的串联,并针对高速运行要求分别设计两个子系统的ADRC控制器;最后在平台参数摄动和道路扰动的环境下进行仿真.结果表明,ADRC控制器能够在0~40m/s速度范围内控制平台完成平稳和高精度的横向运动.本研究可为高速高机动移动平台的工程化设计提供指导.

关键词: 高速移动平台 轮式车辆 轮式机器人 横向运动 自抗扰控制

Study on the lateral locomotion control of ADRC-based high-speed mobile platform

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Abstract:

The active disturbance rejection control (ADRC) method was utilized to study the lateral locomotion control, which is a key technology for the platform (such as high-speed wheeled vehicle and robot) intelligence and autonomous. Firstly the platform lateral locomotion mathematic model with constraints was given, and the ADRC was briefly introduced. Then the model was transformed to a series format with affined models of two sub-systems, and the two ADRC controllers were designed for the two sub-systems, respectively. Finally, the simulations were done under the system parameter perturbations and the road disturbances condition. The results show that the ADRC controllers can make the platform to accomplish smooth and high precision lateral locomotion within 0~40m/s velocity scale. This work can give guidance to the engineering study and design for the high-speed and high-mobility platform.

Keywords: high-speed mobile platform wheeled vehicle wheeled robot lateral locomotion active disturbance rejection control

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