

电驱动柔索并联机器人轨迹跟踪滑模控制

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摘要

针对大射电望远镜粗调系统的非线性、大滞后、多变量耦合以及易受外扰等特点, 提出了一种馈源轨迹跟踪的滑模控制策略. 该方法通过分阶段加入指数趋近控制来加快系统的响应, 同时利用模糊控制器实时调整滑模控制的趋近律参数, 不仅保证了控制系统的快速性和鲁棒性, 而且能够有效地抑制颤动.

关键词 [柔索并联机器人](#) [滑模控制](#) [伺服控制器设计](#) [轨迹跟踪](#)

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Sliding mode control for trajectory tracking of the electrically driven cable-supported parallel manipulator

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Abstract

<P>The feed cabin of the next generation large spherical radio telescope is pulled with six long cables, which are driven cooperatively with motors to track radio sources. Similar to a parallel manipulator, the cable-cabin structure can be viewed as a cable-supported parallel manipulator (CPM). Due to the inherent characteristics of nonlinearity, delay and multivariable coupling for this flexible structure, a novel control method combining sliding mode control (SMC) with fuzzy logic control is developed to realize trajectory tracking of the feed cabin, in which SMC parameters can be adjusted with fuzzy logic in real time. At the same time the exponent approximating control is added by grading. This approach not only increases the respond speed and improves the robustness of the control system, but also weakens its chattering. Simulation results show the effectiveness of the proposed method.
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Key words [cable-supported parallel manipulator](#) [sliding mode control](#) [servo controller design](#) [trajectory tracking](#)

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