HIERARCHICAL SLIDING MODE CONTROL OF A SPHERICAL ROBOT DRIVEN BY OMNI WHEELS

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Abstract

The hierarchical sliding mode control (HSMC) has been proposed to achieve the position control of a spherical robot driven by Omni wheels. The two-direction movement can be accomplished by the cross type arrangement of driving wheels. Based on the two-layer architecture of HSMC and the Lyapunov stability theorem, the equivalent control of each subsystem is deduced, and then the total control law is derived. The original state dependent switching scheme of the HSMC will cause the failure of position control. So it has been modified as a positive constant without any switching to achieve the position control.

Keyword：Hierarchical sliding mode control; Spherical robot driven by Omni wheels.