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被动力伺服系统摩擦非线性控制

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摘要

提出了一种用于补偿力伺服系统中摩擦力作用的基于非精确模型的非线性控制器。摩擦力是影响系统性能的一个重要因素，针对摩擦非线性对被动式电液力伺服系统跟踪性能的影响，
提出一种用于力控制系统摩擦非线性补偿控制器。其基于Lyapunov稳定性定理，不需摩擦力矩的准确模型，
只需参数上界值，是一种基于非精确摩擦模型的非线性控制器。仿真与实验结果表明：与一般的PID控制相比，
该控制器能更好地消除摩擦非线性的影响。此算法对力控制系统的摩擦力抑制具有一定的借鉴作用。

关键词 流体传动与控制 摩擦力矩补偿 非线性控制 力控制系统 被动式力伺服系统

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Nonlinear control of friction in passive force servo system

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Abstract

A nonlinear controller based on non presision model was proposed to compensate the friction in the force servo system. Friction is one of the important factors affecting the system performance. Considering the in fluence of the friction nonlinearity on the tracking behavior of the passive electro hydranlic force servo system, a controller for compensating the friction nonlinearity in the force control system was suggested. The controller is based on Lyapunov stability theorem, it only needs the parameter upper bounds without need of precision friction model. It is a nonlinear controller based on a non precision friction model. Simulation and experiment results showed that compared with the conventional PID controller, the suggested controller is better at eliminating the influence of friction nonlinearity. The algorithm gives a reference to the friction suppression in the force control system.

Key words fluid transmission and control friction torque compensation nonlinear control force control system passive force servo system

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