



2006年第2期 总第27期(卷) 文章来源: 南京理工大学 自动化系, 江苏 南京 210094 | Nanjing University of Science and Technology

基于时间次优补偿的齿隙非线性系统的切换控制 无

摘要: 以伺服系统为研究对象, 提出了一种针对齿隙非线性系统的切换控制方法。在正常情况下采取线性控制, 而在齿隙期间则采用基于时变滑模平面的时间次优控制; 给出了一种监督控制机制, 使系统能够选择合适时机由线性控制切换至时间次优滑模控制, 保证整个系统为有界输入 有界输出(BIBO)稳定。理论分析和仿真研究表明: 该方案能够有效地消除由齿隙引起的冲击干扰, 同时提高了控制器的鲁棒性。

关键词: 齿隙; 滑模控制; 时间次优控制; 非线性控制; 伺服系统

中图分类号: TP273

参考文献:

- [1] TAO G, Kokotovic P V. Adaptive control of systems with backlash [J]. Automatica, 1993,29(2): 323-335.
- [2] Su C Y, Tan Y H, Stepanenko Y. Adaptive control of a class of nonlinear systems preceded by an unknown backlash like hysteresis [J]. IEEE Conf on Decision & Control, 2000: 1459-1464.
- [3] Dean S R H, Surgenor B W, Iordanou H N. Experimental evaluation of a backlash inverter as applied to a servomotor with gear train [C]. Proceedings of the fourth IEEE Conference control applications, 1995: 580-585.
- [4] Chunmei J, Yang Q, Ling F, Ling Z. The nonlinear dynamic behavior of an elastic linkage mechanism with clearances [J]. Journal of Sound and Vibration, 2002,249(2): 213-226.
- [5] TAO G, MA X, LING Y. Optimal and nonlinear decoupling control of systems with sandwiched backlash [J]. Automatica, 2001,37: 165-176.
- [6] Ezal K, Kokotovic P V, TAO G. Optimal control of tracking systems with backlash and flexibility [J]. IEEE Conf on Decision & Control, 1997: 1749-1754.
- [7] Gebler D, Holtz J. Identification and compensation of gear backlash without output position sensor in high precision servo systems [C]. Proceedings of the 21th Annual Conference of the IEEE, Industrial Electronics Society, 1998: 662-666.
- [8] Weeraaoriya S, Low T S, Al Mamun A. Design of a time optimal variable structure controller for a disk drive actuator [C]. Proceedings of the IECON' 93, 1993: 15-19.

Backlash Nonlinearity Switching Control with Proximate Time Optimal Compensation

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Abstract: Based on servo system, a backlash nonlinear switching control scheme with PTO (proximate time optimal) compensation was presented. With linear controller used in contact period, sliding control with PTO surface is switched into when system entering backlash. A supervising mechanism was introduced to find suitable moment switching from linear control to PTO sliding control, ensuring boundary input and boundary output(BIBO) stability of the whole system. The design can effectively eliminate the colliding disturbance resulting from backlash and improve the robustness of controller.

Key Words: backlash; sliding system; proximate time optimal system; nonlinear control; servo system

发布者:sy

发布时间: 2006年4月27日

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