

电机与电器

开关型电磁铁控制比例伺服阀的方法及实验研究

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摘要:

提出利用开关电磁铁构成单电磁铁式电液比例伺服阀的方案。在闭环控制基础上, 提出自适应前馈补偿方法, 解决开关电磁铁的非线性问题; 采用抗饱和和积分控制方法, 在消除稳态误差的基础上, 减小电磁铁动态响应时间。在理论上解释2种方法的原理, 试验验证2种控制方法的效果。另外, 利用电磁铁心速度反馈, 增大闭环回路增益, 进一步减小电磁铁的动态响应时间。结果表明, 与现有采用比例电磁铁的技术相比, 新方案具有设计简单、成本低的优点。

关键词: 比例伺服阀 电磁铁 前馈 自适应 积分器

Study on Controlling Theories and Methods of Switching Solenoids Proportional Servovalve

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Abstract:

A new scheme for electrohydraulic proportional servo valves with switching solenoids was presented. A method of the adaptive feed forward compensator (AFFC) to correct static nonlinear characteristic of the switching solenoids is proposed based on closed loop control. The transient time duration is shortened significantly by using the anti-saturation integral control (ASIC) techniques, while the static error is maintaining at zero. The principles of AFFC and ASIC are explained theoretically and tested in experiments. Moreover, the results show that the transient time duration is even shorter when the gain of the close feedback loop was increased in the scheme, the scheme has the advantages of simple design and low cost.

Keywords: proportional servo valve solenoid feed forward adaptive integrator

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