

工程与应用

柴油机共轨压力模糊自适应PID控制研究

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摘要 柴油机高压共轨燃油系统中, 共轨压力决定了燃油喷射压力, 共轨压力随不同工况的调节能力及其压力的稳定性从根本上影响着系统性能。针对共轨压力控制, 设计了模糊PID控制器, 增加了积分分离与轨压预控制技术, 给出了共轨压力的控制策略和实现方法。通过对PID参数的在线自适应整定, 实现了在不同柴油机工况下对不同共轨压力变化的最佳控制。台架实验结果表明, 共轨压力随柴油机转速与单次喷油量的增加应相应提高; 当柴油机转速较高时, PID控制器应采用较大的控制参数; 轨压预控制可有效地减少轨压波动和缩短轨压稳定时间; 提出的控制策略和实现方法可把轨压控制偏差稳定在1.7%以下。

关键词 [内燃机](#) [柴油机](#) [燃油系统](#) [压力控制](#) [PID控制](#)

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Research on rail pressure control of diesel engine based on fuzzy PID

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Abstract

The fuel injection pressure rests with the pressure in the common rail of common rail fuel injection system. The performance of system is influenced severely by the adjustment and stability of rail pressure depending on certain operating condition. A fuzzy PID is designed; the technologies of integrator separateness and pre-control for high pressure governing are added; the control strategy and realizing means are introduced. The optimal rail pressure control under different conditions is realized by online adjustment of PID control parameters. The bench test results show that the common rail pressure should increase with adding of engine speeds and injection quantity; governor parameters of PID should be chosen bigger value in high engine speed; a pre-control for high pressure governing based on the operating point is used to reduce delay time and to keep the governor deviation small; the pressure in common rail is kept at an almost constant value which fluctuation range is no more than 1.7% by the recommended control strategy and means.

Key words [IC engine](#) [diesel engine](#) [fuel injection system](#) [pressure control](#) [PID control](#)

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