

重型混合驱动车辆换挡过程主动调速控制技术 Active Speed-tuning Control in the Process of Gearshift for Heavy PSHEV

王伟达 李宏才 项昌乐 韩立金 刘亚辉

北京理工大学

关键词: 混合驱动车辆 主动调速控制 换挡过程

摘要: 混合驱动车辆由于具有多个动力源从而使主动调速控制难度增大。研究了减小换挡操作元件操作冲击的主动调速控制算法,提出了采用双环控制结构的主动调速控制。该算法包括两个层次的转速调节:外环的换挡制动器/离合器主、被动端速差调节采用增量式PID控制;内环的发动机、电动机、发电机部件的目标转速调节采用模糊控制。通过开发的混合驱动控制器ECU对算法进行了在线台架试验标定与验证。试验结果表明,设计的主动调速控制方法实现了调速部件的协同控制,可以保证换挡过程快速、平顺地完成,换挡时间与冲击度等指标符合系统要求。The active speed-tuning control in the process of gearshift can ensure the ideal gear-shifting quality and the driving performance. For parallel and series hybrid electric vehicle (PSHEV), the control is more difficult because of the multi-powers. The active speed-tuning control algorithm used to reduce the impingement of components and the dual-loop control algorithm was presented in this paper. The outer control loop based on the increment PID algorithm controlled the speed error between the active and passive components; the inner control loop based on the fuzzy control logic controlled the regulation of the engine, electric motor and the generator. The online tests on the bench were carried on using the ECU of PSHEV. The test results indicated that the active speed-tuning control algorithm could control the components working harmoniously and ensure a fast and smooth gearshift.

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