

汽油机HCCI燃烧过渡过程控制策略 Transient Operation Strategy of Gasoline HCCI Engine

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摘要: 利用可变气门机构使部分残余废气留在缸内,是实现汽油机HCCI燃烧的切实可行的方法,然而多气门参数的调节又给燃烧控制增加了难度。本文通过试验,研究了全可变气门机构中4个控制变量对汽油机HCCI燃烧过程的影响,并对过渡过程中发动机负荷相对于各控制变量的动态响应时间进行了比较。研究发现,实现HCCI燃烧过渡过程的快速响应,应当采用适当的控制参数的耦合策略。试验结果表明,进、排气门相位的对称性原则和气门升程的同步性原则可以简化耦合策略,并改善IMEP的过渡响应。这一结果为4VVAS-HCCI汽油发动机过渡过程控制策略的研究提供了参考。 One practical and adequate approach to achieve HCCI combustion in the gasoline engine is trapping hot burned gas via fully variable valve actuation, but the control methods become complex with various adjusted valve parameters. Through the experiment research, transient response of the HCCI engine to change in the four control variables of 4VVAS were investigated respectively, and the response time for the four actuators constants were compared. It was found that, in order to realize fast transient operation in HCCI mode, appropriate coordinated and synchronous operation of the four actuators is required. The experimental results show that, during coupling regulation of the four variables, symmetric principle of valve timing and synchronal principle of valve lift are proposed to simplify coupling strategy and improve IMEP transition. The obtained result forms the foundation of transient control strategy for the HCCI engine based on the 4VVAS.

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