

甲醇缸内直喷发动机均质燃烧特性研究 Experiment on Homogeneous Charge Combustion Characteristics of Direct-injection Spark-ignition Methanol Engine

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关键词: 缸内直喷 均质燃烧 甲醇发动机 燃烧特性 试验

摘要: 在一台四缸柴油机改造的火花点火甲醇缸内直喷发动机上, 高负荷时, 在进气冲程将燃油喷入缸内, 形成近化学计量比的混合气来实现均质燃烧。通过对典型工况的气缸压力的测量和分析, 探讨了不同参数对甲醇发动机燃烧特性的影响。结果表明: 甲醇缸内直喷发动机最大功率和最大扭矩比原机分别提高5.88%和20.90%, 发动机最高热效率可达35.3%, 远高于普通汽油机水平。甲醇缸内直喷发动机的滞燃期和急燃期随负荷的增加而变小。全负荷时, 甲醇发动机的燃烧放热起点随转速的增大而推迟, 滞燃期和急燃期随转速的增大而增加。发动机循环变动随工况的变化规律与滞燃期一致。For a direct-injection spark-ignition (DISI) methanol engine retrofitted from a four-cylinder diesel engine, fuel is injected into the cylinder during the intake stroke to realize the homogeneous charge combustion for the high power output. The cylinder pressure of typical operating conditions was measured and analyzed. The effects of different parameters on methanol engine combustion characteristics were investigated. The results showed that the maximum power output and torque of the methanol engine are 5.88% and 20.90% higher than original diesel engine, respectively. The maximum brake thermal efficiency reaches 35.3% at a speed of 1500r/min, and a brake mean effective pressure of 0.85MPa, which is higher than the conventional gasoline engine. The ignition delay period and rapid combustion phase increase with decreasing load. The start of combustion is postponed with increasing speed at full load. The ignition delay period and rapid combustion phase increase with increasing speed under full load. The change of the cyclic variations has the approximate trend with that of the ignition delay period at different operating conditions.

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