

Research on Steam Injection Technology of Extended Range Engine Cylinder for Waste Heat Recovery

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Abstract : The engine cooling water and exhaust gas contain a large amount of available energy. In order to improve energy efficiency, a steam injection technology based on waste heat recovery is proposed. The models of cooling water waste heat utilization, exhaust gas waste heat utilization, and exhaust gas-cooling water waste heat utilization were constructed, and the effects of the three modes on the performance of steam injection were analyzed, and then the feasibility of in-cylinder water injection steam technology based on waste heat recovery was verified. The research results show that when the injection water flow rate is 0.10 kg/s and the temperature is 298 K, at a cooling water temperature of 363 K, the maximum temperature of the injection water heated by the cooling water can reach 314.5 K; at an exhaust gas temperature of 973 K and an exhaust gas flow rate of 0.12 kg/s, the maximum temperature of the injection water heated by the exhaust gas can reach 430 K; Under the condition of cooling water temperature of 363 K, exhaust gas temperature of 973 K and exhaust gas flow rate of 0.12 kg/s, after cooling water and exhaust gas heating, the maximum temperature of the injection water can reach 463 K. When the engine is 1200 rpm, the water injection volume is 30 mg, and the water injection time is 36°CA, the engine power increases by 2% and the fuel consumption is reduced by 2.6%.

Keywords : cooling water, exhaust gas, extended range engine, steam injection, waste heat recovery

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