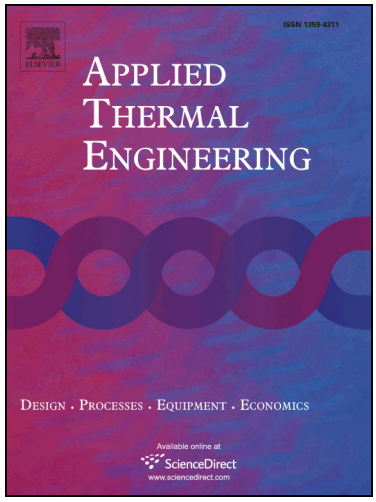

Power Management Strategy for a Parallel Hybrid-power Gas Engine Heat Pump System

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Abstract:

Hybrid-power gas engine heat pump(HPGHP) system is a novel air conditioning system, which has two power sources, the gas engine and dual-use motor respectively. Based on the experimental tests on HPGHP system, the key components models of the system has been estalished in this paper. In order to keep the gas engine always running with high thermal efficiency and reducing the gas consumption, a preliminary rule-based control strategy is first described in the paper to distribute the power sources. Then, for obtaining better fuel economy, the equivalent gas consumption minimization mathematical models and power balance principle are established. At last,the equivalent gas consumption minimization strategy is put forwad and the torque curves of the engine and motor are optimized under different operating modes, to minimize the equivalent gas consumption. The results show that the gas engine can always run in economical zone with high thermal efficiency above 0.25 in different working modes;The gas consumed rate reaches the minimum value of 284.62 g/(kWh), 286.93 g/(kWh), 296.6 g/(kWh) in mode C, mode D and mode L, when the compressor speed are 950 rpm, 1450 rpm, 2150 rpm, respectively; The average PER of HPGHP system are 0.894, 0.969, 1.049 in mode C, mode D and mode L,respectively.

Keywords:Power management; HPGHP; Equivalent gas consumption; Fuel economy