

过程系统工程

## 质子交换膜燃料电池混合动力系统能量优化的仿真分析

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**摘要** 分析了混合动力系统的控制目标及需要考虑的几个关键参数。以PEMFC混合动力系统为对象, 分别针对给定负载模式和实时运行模式进行控制策略设计和能量优化仿真。对给定的负载模式, 采用遗传算法对多约束组合优化问题进行求解, 仿真结果证明了算法的可行性。对于实时运行模式, 在原有模糊控制策略的基础上, 引入燃料电池电压和电压变化量对模糊输出进行两级修正。仿真结果表明, 改进后的模糊控制策略可以有效提高燃料电池运行效率, 降低燃料电池功率波动。

**关键词** [质子交换膜燃料电池](#) [混合动力系统](#) [能量优化](#) [模糊控制](#)

分类号

## Simulation and analysis of energy optimization for PEMFC hybrid system

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### Abstract

The control objective and several key parameters of PEMFC (proton exchange membrane fuel cell) hybrid system were analyzed. Control strategy design and energy optimization simulation were made individually for a given cycle and real time operation. For the given cycle case, genetic algorithm was adopted to solve the multi-constraint combinatorial optimization problem. The simulation result showed the algorithm's feasibility. As far as the real time operation was concerned, based on the original fuzzy control strategy, the fuel cell voltage and voltage variance parameters were introduced to apply two-level modification on the fuzzy control output. The result revealed that the improved fuzzy control strategy could enhance fuel cell efficiency and reduce power fluctuations.

**Key words** [PEMFC](#) [hybrid system](#) [energy optimization](#) [fuzzy control](#)

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