

混合动力汽车发动机快速起动机瞬态燃烧和碳氢排放

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摘要

介绍了用于混合动力汽车动力系统的发动机快速起动模拟试验台架系统和相关试验。针对一台进气道喷射式汽油机, 模拟起动/发电一体化电机, 研究在不同拖动转速下快速起动过程的瞬态特性和排放特性。试验结果表明: 发动机在快速起动情况下, 瞬态特性突出; 随着拖动转速升高, 进气歧管压力降低, 对应的喷油策略也应随之调整; 在发动机起动后的第2到第9循环, 容易发生不完全燃烧和失火, 并随着拖动转速升高, 不完全燃烧程度增加, 导致碳氢排放过高。在不同拖动转速下, 三效催化剂都不能高效转化碳氢排放, 但转化效率存在差异。随着拖动转速升高, 催化剂的转化效率先降低后又升高。从优化排放角度来看, 在本文试验条件下, 快速拖动至1000 r/min起动时, 使用催化剂后排放最低。

关键词 [动力机械工程](#), [混合动力汽车](#), [起动/发电一体化电机](#), [快速起动](#), [碳氢排放](#), [瞬态特性](#)

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Transient combustion and hydrocarbon emissions from a hybrid electric vehicle engine under high speed rapid start conditions

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Abstract A test bench to simulate the rapid start of the engine with an integrated starter/generator system for the hybrid electric vehicle was presented. The transient behaviors, especially the transient hydrocarbon(HC) emissions from a inlet port fuel injected gasoline engine under rapid start at different speeds were tested to simulat the engine with ISG. The test results show that the engine demonstrates more transient behavior under the rapid start conditions at high cranking speeds than the traditional engine under the normal start conditions. The intake manifold pressure is lower when the cranking speed increases, thus the fuel metering strategy should be modified. The incomplete combustion and misfire are more liable to come into being at the first 2~9 cycles during the start process. With the increase of cranking speed, the incomplete combustion becomes more serious, leading to higher HC emissions. Under the start conditions the HC emissions can not be converted effectively by the three way catalytic converter no matter how high the cranking speed is but its conversion rate depends on speed. When the cranking speed increases, the conversion rate decreases firstly, then increases again. For the condition of this study, the post catalyst HC emissions appear minimum at the speed about 1000 r/min.

Key words [power and machinery and engineering](#) [hybrid electric vehicle](#) [integrated starter/generator](#) [rapid start](#) [hydrocarbon emission](#) [transient behavior](#)

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