

黄粉莲,纪 威,张 禄,周 炜.基于OPTIMUS的柴油机配气正时及喷油提前角的优化[J].农业工程学报,2012,28(15):27-32

基于OPTIMUS的柴油机配气正时及喷油提前角的优化

Optimization of valve timing and injection advance angle of diesel engine based on OPTIMUS

投稿时间: 2012-02-28 最后修改时间: 2012-07-11

中文关键词: [柴油机](#),[优化](#),[配气正时](#),[喷油提前角](#),[OPTIMUS](#)

英文关键词: [diesel engine](#) [optimization](#) [valve timing](#) [fuel injection advance angle](#) [OPTIMUS](#)

基金项目:国家科技支撑计划项目(2009BAG13A04)

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中文摘要:

柴油机的配气正时与喷油提前角对其性能影响很大,最佳的匹配参数能够形成缸内良好的空燃比及较佳的燃烧效率,从而获得较高的动力性及较低的燃油消耗率。为得到不同工况下配气正时与喷油提前角的最佳组合,该文将增压直喷柴油机工作过程的SIMULINK仿真模型导入OPTIMUS多学科优化平台;以进气迟后角和排气提前角以及喷油提前角为优化设计变量,以柴油机的经济性和动力性为设计目标进行优化计算。额定工况下该发动机的优化结果是:进气迟后角为 42° CA,排气提前角为 60° CA,喷油提前角为 16° CA。仿真和试验结果表明:模型设计合理准确,优化后柴油机动力性和经济性均有所改善,该研究可为柴油机的改进和优化提供参考。

英文摘要:

The valve timing and fuel injection advance angle have enormous influence on the performance of diesel engine. The optimum matching of them is conducive to forming the nicer air-fuel ratio and better combustion efficiency in-cylinder; then the engine can obtain higher power output and lower fuel consumption. To optimize the matching, Firstly, the numerical simulation model of turbocharged direct injection diesel engine was imported into the OPTIMUS, which is a multidisciplinary optimization platform. Then the intake lag angle, exhaust and injection advance angle were regarded as the optimization variables as well as the maximum torque and minimum specific fuel consumption were the optimization objective. After optimization, the mean engine power output has been increased by 2.57%, and the mean specific fuel consumption has been decreased by 2.66%. Finally, the simulation and experimental results show that the design of model is reasonable and accurate, and the overall performance of diesel engine is improved after parameterized optimization.

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