

活塞顶部功能梯度涂层的有限元模拟热分析

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摘要: 采用ANSYS10.0有限元分析软件,取内燃机活塞的第三类边界条件,采用先热分析再结构分析的间接分析方法,模拟了陶瓷/金属梯度涂层的圆柱体在稳态工作情况下的温度及其热应力的分布情况;考察了梯度组成分布函数指数 p 对活塞头部的温度场影响,以及对陶瓷/金属梯度涂层热应力的影响,得到了缓和热应力的梯度组成分布函数指数 $p=0.6$ 的优化设计结果。The temperature and thermal stress distributions of ceramics/metal functional gradient cylinder were simulated by finite element method (FEM). Using the indirect solution method of thermal analysis and subsequently structural analysis of ANSYS10.0 software, the simulations were carried out under stable working conditions and the third type boundary conditions of piston in IC engine. The effects of gradient composition distribution index p on the temperature of piston head and the thermal stress at the gradient layers of ceramics/metal were studied respectively. Finally, the optimal design result corresponding to the gradient composition distribution index $p=0.6$ was obtained for easing the thermal stress.

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