

拓扑优化技术在降低正时齿轮罩辐射噪声中的应用 Design of Low Noise for Timing Gear Cover Based on Topology Optimization

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关键词: 正时齿轮罩 噪声 拓扑优化 啮合频率 模态分析

摘要: 应用Altair Hyperworks 的OptiStruct优化模块, 采用拓扑优化技术, 对某柴油机正时齿轮罩进行了优化, 得到了最佳的质量分布, 据此进行了结构改进, 使该正时齿轮罩的模态振型避开正时轮系啮合激励频段, 进而降低辐射噪声。通过有限元法和边界元法联合求解得知新正时齿轮罩辐射声功率降低了2.4dB, 对比实验验证了计算结果。The optimization of timing gear cover was carried by using Altair Hyperworks, to gain the optimal mass distribution. Hereby, the structural modification was performed. The mode of timing gear cover avoided the frequency range of timing gear train excitation, to reduce the radiated noise. In order to calculate radiated sound power of timing gear cover, the finite element method (FEM) and boundary element method (BEM) were used. The calculating result shows that the radiated sound power on new timing gear cover decrease by 2.4dB, which was validated by the verification test.

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