

## 基于时域声辐射模式的板结构振动 $H^\infty$ 主动控制

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关键词: 振动控制 时域 声辐射模式 伴随系数

摘要: 基于时域声辐射模式, 通过前几阶声辐射模式伴随系数使结构振动辐射的声功率最小化, 建立了包含有干扰力和控制力的结构振动状态空间方程。基于 $H^\infty$ 控制策略, 以多个点力作动器为控制力源, 建立以时域声辐射模式伴随系数为输出反馈的控制模型。以简支板为例, 分别作用1个和2个控制力, 讨论了主动控制的效果。仿真计算表明, 采用 $H^\infty$ 控制策略可使辐射声功率明显降低, 有效地实现了基于声辐射模式的主动控制策略。而且增加控制力个数后, 辐射声功率进一步下降, 同时M个作用力能抵消前M阶声辐射模式的声功率。Based on time radiation modes, using the first several acoustic radiation adjoint coefficients to minimize the acoustic power from vibrating structure, is a new strategy in active control. State space equations from the structure vibration system with disturbing forces and controlling forces were presented. Using several point force actuators as control sources, the control model based on time adjoint coefficients was built via  $H^\infty$  control theory. Taking a baffled rectangular plate as an example, the model was studied using one and two controlling forces respectively, and the effect of active control was discussed. Finally, the simulation results indicate that the acoustic power decreases obviously via  $H^\infty$  control strategy, which effectively make the active control strategy based on radiation modes come true. Besides, the radiated power decreases more with more controlling forces, and it is demonstrated that using M controlling forces can counteract the first M radiated power.

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