

有限长圆柱壳中振动功率流的输入与传播

Vibrational Power Flow Input and Transmission in a Finite Cylindrical Shell

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中文摘要:

以一有限长弹性圆柱壳受迫振动的功率流为研究对象, 用Flügge方程和Hamilton变分原理推导了壳体的运动方程, 获得了壳体在某一点受简谐外载作用下的响应。利用功率流的基本定义, 研究了当壳体受迫振动时输入结构的功率流和壳体中各内力所携带功率流沿轴向方向传播时的变化规律, 旨在为工程中类似结构的减振降噪提供指导性原则。研究表明, 输入功率流与传播功率流随频率的变化规律在壳体环频率附近存在着一些差异; 增加结构的损耗因子, 可有效地抑制功率流的传播; 在高频时, 壳体中的运动波以弯曲波为主。

英文摘要:

The structural wave power flows in an elastic finite cylindrical shell are studied when a simply harmonic point force is applied on it. Motion equations of the shell are derived by equation and the variational principle. By using the basic concept of power flow, the characteristics for input vibrational power flows of the structure and transmission power flows in the axial direction carried by different internal forces of the shell are investigated. The studies show that there are some differences between input power flows and transmission power flows around the ring frequency in regular rules varying with frequencies, it is effective to reduce the transmission power flows in case of the structural damping increasing, and the motion wave in a finite cylindrical shell at high frequencies is mainly flexuous type wave. These can provide some guidelines for vibration and noise control.

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