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<< ◀◀ 前一篇 ｜ 后一篇 ▶▶ >>

多维动力吸振器对复杂悬臂结构减震之应用

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APPLICATION OF MULTIPLE DYNAMIC ABSORBERS TO REDUCING THE VIBRATION LEVEL OF A COMPLEX CANTILEVER STRUCTURE

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摘要 一个复杂悬臂结构在20赫芝附近有两个密接的共振峰,导致结构根部破坏。本文提出了用多维动力吸振器对它进行减震,为了克服通常的调谐吸振器对结构频率十分敏感的缺点,在结构的某一截面上悬挂了六个吸振器,吸振器随着结构沿任意方向振动,而且六个吸振器的刚度与阻尼参数可以互不相同,以展宽其吸振频带,为了寻找最优参数和研究这些参数变化时对结构响应之影响,计算了大量的响应曲线,因为结构阻尼很小,吸振器阻尼较大,所以这是一个非比例阻尼的动力分析问题。本文用复特征解法和模态综合法处理了这个问题。

关键词：

Abstract： In a complex cantilever structure there are some closed resonance peaks in the vicinity of 20Hz, causing a serious bending moment at its root. The application of multiple dynamic absorbers to reducing its vibration level is proposed in this paper. Six absorbers are hung on a given section of the structure to overcome the drawback of the usual tuned absorbers, i. e. excessive sensitivity to the tuning parameters. They can vibrate in all directions following the structure, but their stiffness and damping parameters of these absorbers are different from each other, so that their frequency range is made wide enough to cover the resonance frequencies.In search of the conditions for minimizing the bending stress of the structure and for the sake of studying the effects of the parameters on the dynamic response, a great number of response curves at the top of the structure, bearing the harmonic excitation from the base movement, are calculated as the parameters of these absorbers vary in a considerable range. Since the damping of the structure is very small and that of absorbers are large enough, so it is a dynamic analysis problem with non-proportional damping. This problem has been solved by a complex eigen-solution method and a modal synthesis method in the present paper.

Keywords：

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