

中文摘要

本文旨在應用有限元素分析及實驗模態分析探究自由邊界曲樑異面振動問題。首先應用有限元素分析法---選擇適當曲樑元素，建立幾何模型，再進行模態及簡諧分析可求得自由邊界曲樑之模態參數，即自然頻率、模態振型及頻率響應函數。其次使用實驗模態分析，以衝擊錘為驅動器、加速度規為感測器的方式進行實驗，可求得頻率響應函數及關聯性函數，再將頻率響應函數作曲線嵌合，即可求得自由邊界曲樑之自然頻率、阻尼比等模態參數及振動模態。最後，將有限元素分析與實驗模態分析之結果相互比較驗證，發現二者參數結果相當吻合，確任由有限元素分析所建構理論模型足以模擬自由邊界曲樑。

英文摘要

This study investigates out-of-plane vibrations of curved beams using finite element analysis and experimental modal analysis. First, by finite element analysis, selecting a suitable curved beam element, creating geometric model and proceeding modal analysis and harmonic analysis, we obtain modal parameter and frequency response function. Second, by experimental modal analysis, using a hammer and an accelerometer as a driver and a sensor respectively, we carry on the experiment and obtain frequency response functions and coherence functions. Moreover, by curve fitting method we get natural frequencies, damping ratios and mode shape from frequency response functions. Finally, comparing the FEA result and EMA result, the agreement between these two set of parameter are fairly good.