

混成形狀記憶螺旋彈簧用於半主動懸吊平台減振之研究 = The study of using hybrid shape memory helical spring in the ...

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摘要

在本研究裡，我們用四個混成記憶材料製成之螺旋彈簧裝於懸吊平台，並在不同控制溫度下探討其模態自然頻率及阻尼比。螺旋彈簧是以超彈性 NiTi 線先熱處理成螺旋形狀，然後再包覆多層記憶型高分子材料套管在其外面而製成。首先研究單獨混成記憶螺旋彈簧的動態特性，在實驗中我們發現當溫度從室溫加熱到 90℃，彈簧的第一自然頻率可降低 50%；另一方面，我們也發現伴隨著溫度的增加彈簧的阻尼比會跟著減少，此現象應是溫度高於材料之玻璃轉換溫度所致材料之特性。最後我們研究被四個螺旋彈簧所支撐的平台在溫度控制下的自然頻率變化。研究中所推導之平台彈簧在前幾個模態下的自然頻率與實驗量測有相當的一致性，而且實驗中也展示平台之振動位移振幅可隨著控制溫度之增加至 90℃，而大幅降低至 20% 以下。

關鍵詞：螺旋彈簧、半主動懸吊平台、形狀記憶合金、形狀記憶高分子材料

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