形狀記憶合金螺旋?q簧用於半主動懸吊平台減振之研究

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摘 要

本研究係探討形狀記憶合金(SMA)螺旋彈簧其材料性質，對其在軸向與側向靜態負載以及動態負載下之特性影響，並且將其應用於懸吊平台之半主動減振系統。由於彈簧軸向與側向剛性並不相同，若能分別確立兩者間之關係，可有助於日後SMA螺旋彈簧廣泛之應用。本研究使用由Ni-Ti合金製成之螺旋彈簧，SMA之低溫相為麻田散體，高溫相則為沃斯田體，而沃斯田體較麻田散體具有更高之楊氏係數，實驗中藉由通電加熱或外部加熱來控制SMA彈簧之溫度，同時改變其材料性質。由於SMA螺旋彈簧可能在不同情況下使用，除了已知彈簧軸向剛性、共振頻率之理論推導外，尚須彈簧側向剛性及共振頻率之理論推導互相配合，以確定實驗結果之準確性。在了解SMA螺旋彈簧在不同邊界下之軸向與側向剛性以及動態特性後，更進一步將其製成半主動懸吊系統，透過溫度的變化改變懸吊系統之剛性、阻尼等特性以調控整體系統之自然頻率，達到制振之效果。

關鍵詞 : 形狀記憶合金 ; 螺旋彈簧 ; 半主動減振系統

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