

MFC智慧型貼片與SSD技術應用於蜂巢三明治平版的聲振控制

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摘要

結構的振動抑制和噪音削減技術，一開始發展的被動式阻尼層，到近年來使用不同的智慧型材料作為感測器和致動器，並結合不同的控制原理，形成所謂的主動式控制。現今為了平衡控制系統的效率、穩定性和可適性，發展出主被動式（混合式）技術。如何針對不同的系統應用，採取適當的控制方法，是現今很多專家學者研究的課題。以上問題皆為從事消除或抑制結構的振動與噪音的學者重要研究領域。本論文使用MFC壓電致動器與SSD技術應用在蜂巢三明治平板的半主動式振動控制，並且建立理論模型與數值模擬，分析MFC壓電分流器的控制效率。本文以MFC壓電分流器分別針對蜂巢三明治平板前三模態進行振動控制，使用R-shunt、RL-shunt、SSDS與SSDI等方法控制。研究項目包括：（1）如何建立低頻時所需較大的電感值；（2）如何決定最佳的感測器和致動器的位置；（3）MFC片數與電阻值對各控制方法的差異，以尋求最佳組合。根據初步研究結果顯示，抑制振動效率SSDI > RL-shunt > SSDS > R-shunt，RL-shunt與SSDI在電阻較小抑振效果較佳，而SSDI在第一模態抑振效率可高達90.5%；SSDS則隨著MFC片數增加效果較好，R-shunt在電阻較大效果較明顯，電阻值在2~4萬歐姆附近抑振效果較好。

關鍵詞：MFC壓電致動器、SSD技術、蜂巢三明治平板、半主動式控制

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