壓電能量擷取系統的模擬分析

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摘 要

將日常生活環境當中隨處可得的能量轉換成電能是現在最熱門的研究項目。壓電擷能器則是利用振動使壓電材料變形進而產生電流，壓電材料也可以配合微機電製程，正適合作為能量擷取的材料，因此最近幾年壓電材料以及能量擷取的研究快速發展，壓電材料的成本也越來越低，讓使用壓電材料應用於日常生活中發電的可行性越來越大，壓電材料同時具備了質量輕、體積小特點，更是符合現今微小精密發展的趨勢，正因壓電材料有著這些優點，所以早已是最近幾年所研究的熱門材料之一了。 本文研究目的有兩個，瞭解擷能器壓電片之黏貼位置和壓電能量轉換的關係，以獲得最大的轉換能量。電能擷取電路之分析，以達到最佳轉換效率。本文以Matlab 模擬分析各種不同邊界條件下，樑振動情形，找出壓電片黏貼法則，黏貼在振動體應變最大處，可以得到最大轉換電能；而介面電路輸入阻抗是獲得最高能量轉換的關鍵，電路輸入阻抗必須與壓電等效輸出阻抗相匹配，才可得到最高的轉換效率。

關鍵詞 : MFC 壓電致動器，壓電擷能器，阻抗匹配，振動模態。

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