

壓電擷能器效能的數值分析

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摘要

一般壓電擷能器所能擷取的能量約從幾微瓦 (μw) 到幾毫瓦 (mw)，其實真的很小，但為什麼還是吸引眾多知名研究團隊將它訂為重點研究領域？那是因為它的機構簡單，面積很小（小於 1cm^2 ），在微化的過程中，可配合標準半導體製程和積體電路做整合，這正適合諸多領域的需求，如：無線、遙感勘測、多點分佈無線監測網路及微機電（MEMS）等。壓電擷能器所擷取到的能量真的很小，很難直接供應各種電子設施使用，必須先將電能匯整與儲存，再輸出供應外部設施使用。本文研究目的有二：1. 擷能器壓電片之最佳黏貼位置的選定，以獲得最大的轉換能量。2. 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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