Thunder壓電致動器應用於拍撲式微飛行器之研究

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摘 要

基於第一線人員的需求，微飛行器可以提供複雜環境的即時資訊 。由於體積尺寸的縮小，現有傳統式飛行翼產生飛行效率較不理 想，遂有師法自然之研究。相對於固定翼而言，拍撲翼的飛行系 統如蟲及鳥可以負荷相對較高的重量。現有拍撲翼的發展中，大 多採用馬達做為致動元件。唯許多轉換機構損耗了其微小的動力 。於是有應用智慧型材料發展直接帶動機構為一項研究方向。 美國太空總署發展一種新的智慧型材料- THUNDER壓電致動器 （THin layer composite UNimorph ferroelectric Driver and sEnsoR縮寫）。使用PZT層存有的預應力，使得發揮比很多傳統 壓電致動器更多的輸出特性，且具有更小的體積、更高的調適性 、更經濟的價格及更優異的機械加工性等優點。但由於THUNDER 壓電致動器屬於一個相當年輕的致動元件，因此可參考的資料相 當有限。 基於拍撲翼微飛行器之需要，本論文將針對THUNDER壓電致動器 進行輸出特性研究，並尋找最佳的放大模式。文中將討論 THUNDER在不同邊界條件下的位移、輸出力及動態能量等特性， 並對於其共振模態特性進行模擬及量測。文中並對於THUNDE壓 電致動器的非線性現象所引發的特性進行研究，並利用此一現 象尋找較佳的驅動模式。

關鍵詞 : 壓電致動器 ; 拍撲翼 ; 微飛行器

目錄

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