壓電式無閥微型幫浦之設計研析

詹宗興、鄭江河

E-mail: 9806441@mail.dyu.edu.tw

摘 要

藉由壓電微致動器作為微型幫浦推動液體產生淨流率的驅動源，本文成功設計、製作與組裝新型不鏽鋼凸塊微膜片之無閥壓電微型幫浦。操作時，新型無閥微幫浦輸入160Vpp電壓與250Hz頻率之正弦波後，可產生高達0.779 ml/min之淨流率。本文研析採用計算流體力學(Computational Fluid Dynamics, CFD)套裝軟體ACE+?，經由移動邊界條件(Moving boundary condition)模擬壓電膜片振動，並配合全尺寸幫浦細部幾何型構建立擬真數值模型，以執行暫態解析決定漸張管/漸縮管凸塊薄膜壓電微型幫浦內部流場特性。驅動頻率100－250 Hz時，研析結果發現艙內靠近出口端處出現漩渦對(Vortex Pairs)。另探討擴流器角度於8°－12°變化範圍對壓電無閥微型幫浦效率之影響，結果顯示擴流器於8°有最大的淨流率生成。

關鍵詞 : 無閥微型幫浦、壓電致動器、數值模擬、MEMS

目錄

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