# 用於無閥阻抗微幫浦之新型微電磁致動器之設計、製作與最佳化


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**摘 要**

本研究旨在建立一個用於微型無閥阻抗幫浦之微電磁致動器之最佳化設計理論及模型，並完成其原型之製作與測試。測試值與理論值、模擬值相比較，均有相當－致的結果。在最佳化設計的理論及模擬的建立上，電磁致動器是由電鍍永久磁鐵(CoNiMnP)於高分子材料PDMS薄膜上及一個銅質的電磁鐵所組成。此電磁致動器最佳化設計的目標及重點在於對流體輸出能產生充分的壓縮能量，同時致動器各組件也能具有高的機械強度，可保持可靠、安全、耐久的操作。研究中所建立的理論模型經由有限元素分析軟體驗證。作用在PDMS薄膜上磁力模擬及計算是利用Ansoft/Maxwell3D有限元素分析軟體所完成。薄膜位移的模擬分析及理論模型的驗證是藉由ANSYS有限元素分析軟體完成，而且理論值與模擬值有相當一致的結果。另外，本研究也以一個簡化的耦合振動模型完成幫浦振動在理論及數值上的分析與推導，幫助在最佳化理論及模擬分析過程中了解微幫浦結構之自然頻率等振動問題。在應用上，本研究所提出的無閥阻抗微幫浦，其構造簡單皆為平面結構，可以很容易的和－般生醫晶片相整合。



關鍵詞 : 微電磁致動器，微機電系統，微無閥阻抗幫浦，PDMS，振動分析，容積變化。


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