壓電式噴墨頭之結構分析與效能評估

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摘 要

本論文的目的是為了更深入瞭解利用剪切型壓電致動器之 噴墨頭致動模組的特性。基於上述的目標，將研究的課題區分為以下部分：⑴PZT 致動器壓電特性的分析及特性預測、⑵噴墨頭 模組特性分析與預測、⑶噴墨頭噴墨效能之評估以及⑷剪切型 PZT 致動器動態特性之實驗量測。 由於剪切型PZT 致動器的壓電特性對噴墨頭的影響是最直 接的，因此，初步工作將建立一個有限元素模型以對剪切型PZT 致動器作其特性上的分析。接著，為了瞭解墨水艙內流體負載對 於振動板變形量和噴墨頭系統動態特性的影響，將進一步著手建 立結構與電場以及流場耦合的噴墨頭模組之有限元素模型，以對 噴墨頭模組進行分析及特性預測。而本論文最後則建立噴墨模組 之阻抗模型(Lumped Parameter Model)，此模型的建立將可以為噴 墨頭模組提供系統轉移函數，進一步的預測墨水由入墨口回流以 及從噴墨口形成墨滴噴出之比例，評估噴墨頭模組的效率。最後 將以實驗量測之方式，對系統模型預測之剪切型PZT 致動器動態 特性作驗證。

關鍵詞 : 剪切型壓電致動器，壓電式噴墨頭，阻抗模型，轉移函 數

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