無閥門阻抗幫浦之特性研究

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摘 要

本研究中，我們以實驗和理論方法來進行無閥式阻抗幫浦的 特性研究。實驗部份，無閥式阻抗幫浦是由一組機電壓縮機構、一 對彈性軟管和硬管與兩個觀察用儲水管所組成。彈性的乳膠軟管連 接塑膠硬管構成不對稱的阻抗，並分別在流道的兩端膠合上垂直的 壓克力儲水管以利觀察，透過機電壓縮機構於軟管不同位置上以一 定壓縮行程、波型與頻率壓縮軟管外壁，在流體的傳遞波與反射波 的交互作用下，產生壓力差來驅動流體。根據實驗的結果顯示，流 體的流動方向是可逆的，並且壓力差大小與頻率、壓縮行程和波形 息息相關。由實驗的結果顯示，當軟管長度為50mm、內徑為6mm、 頻率為42 赫茲時，最大流率可達2.45l ?沸in?{1。量測結果顯示流率對 壓縮頻率呈現非線性的複雜反應。 在理論方面的研究，我們以非穩態、一維Euler 方程式，配合 適合的邊界條件來建立一個平面的模擬系統，並與實驗結果作一比 較。分析結果顯示，理論所模擬的流率與驅動頻率的關係與實驗量 測趨勢相近。

關鍵詞 : 無閥門，阻抗幫浦，彈性軟管，波的傳遞。

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