具迴油溝之橡膠唇形旋轉油封迴油現象研究

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摘 要

本研究以實驗與數值方法探討潤滑流體在橡膠唇型旋轉軸密 封元件(Rubber Lip Type Rotary Shaft Seal)中，受到迴油溝(Helix)影響所產生的迴油現象(Pumping)，以及密封元件將洩漏的潤滑 油體反推回油側的物理機制。實驗中利用迴轉測試機台量測密封 元件TCL 36*52*10 於操作狀況下之迴油率(Pumping Rate)，並利 用商用電腦輔助分析CFD 軟體CFD-RCR，針對潤滑流體在唇型 密封元件微流場中之迴油現象建立完整理論模型，進行數值模擬 以預測迴油率，計算結果與實驗量測數據相符，驗證理論模型和 數值方法之正確性。研究中檢視流場結構及壓力分佈對密封機制 的影響，並針對TCL 36*52*10 迴油溝形式進行參數研究，討論 迴油溝高度、寬度、角度及迴油溝數量對迴油率影響，找出設計 趨勢，定出最佳化設計。本研究成功開發了一套密封元件設計分 析之有效工具。

關鍵詞 : 橡膠旋轉軸唇型密封元件、迴油溝、迴油現象、迴油率

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