

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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