發展以階次分析及小波轉換技術之機械故障診斷

陳錦城、林志哲 吳建達

E-mail: 9419893@mail.dyu.edu.tw

摘 要

本論文主要是利用適應性階次追蹤及小波轉換技術運用在引擎故障診斷上，在第一部分利用 適應性的遞迴式最小平方法(Recursive Least-Square)和可變的收斂因子仿射投影演算法 (Variable Step-Size Affine-Projection Algorithm)的理論於階次分析的故障診斷技巧上 。在第二部分利用連續小波轉換技術於內燃機引擎之故障診斷，階次分析的技巧對於轉動機 械的故障診斷而言是一種非常重要工具，傳統故障診斷方法是利用傅立葉分析的技巧伴隨轉 軸的轉速來檢測機械的損壞，然而在轉軸轉速變化的情形下，再取樣過程(Resampling)常被 用於取捨時、頻域上的解析度。此方法有一些缺點，尤其是相鄰近階次與相交越階次上，存 在有頻率抹平(Frequency Smearing)的現象，而本研究是利用高解析的遞迴式最小平方法和 可變的收斂因子仿射投影演算法之階次分析的方法於引擎冷卻風扇之故障診斷，且這些濾波 器可以克服傳統故障診斷於變轉速上會發生頻率抹平的問題。工作內容是將聲音訊號經過遞 迴式最小平方法與可變的收斂因子仿射投影演算法做階次追蹤而得到所需的特徵值，藉此判 斷是否有故障產生。而在實驗完成之後，高解析的階次振幅可以被計算出，且同時完成高解析的階次分析系統於各種不同情況之風扇損壞的評估。從實驗結果可以得知，應用這些適應 性濾波器於風扇之故障診斷確實有其效果。在第二部分介紹小波(wavelet)概念及文獻，小波 分析是一個強而有力的工具，它是更適合用在擷取轉動機械的特徵訊號，在本研究介紹連續 小波轉換(continuous wavelet transform)技術運用在時頻的特徵分析上。

關鍵詞 : 故障診斷，階次分析，遞迴式最小平方法，可變的收斂因子仿射投影演算法，連續小波轉換

目錄

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