小波理論與類神經網路在超音波檢測之應用

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摘 要

鋼鐵材料在焊接時難免會產生瑕疵，焊接瑕疵可以粗分為平面狀及立體狀兩大類。由於前者在應力作用下其尖端的應力集中因素很大，因此極易成長及造成設施的破裂，所以在新建工程中不論其大小如何均需予以檢出，因此在以超音波檢測焊道時如何正確辨識平面狀瑕疵是很重要的課題。 本研究首先準備具有各種不同瑕疵的焊接試片，瑕疵發生於不同部位並有不同的大小。然後利用超音波儀器檢出瑕疵信號。瑕疵信號經小波分析萃取其特徵後再以類神經網路予以辨識分類。在本研究中平面狀瑕疵及立體狀瑕疵的平均正確辨識率分別高達94%及90.19%，可見所設計的處理程序確能辨識不同的種類的瑕疵，未來在進一步改進並經過實用的考驗後，相信一定可以成為一套實用及可靠的智慧型瑕疵辨識系統。

關鍵詞 : 超音波檢測 ; 類神經網路 ; 小波理論 ; 平面狀瑕疵

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