

Low Frequency Laser Ultrasonics for Evaluation of Internal Cracks in Multi-layered Steels

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A novel, non-contact, non-destructive evaluation technique for plate-like specimens which may have internal cracks is now drawing attention. In this technique, pulsed lasers generate ultrasonic waves on the specimen surface [1]. And an interferometer was used to measure the waves of the specimen surface. Investigation about correlation between laser induced ultrasonic waves and size of internal cracks was tried. Resin specimens with various size and location of internal cracks were prepared and ultrasonic waves generated by YAG pulsed laser were measured by laser interferometer. FEM analysis was used to compare with the results of experiments [2]. As a result, this method could detect location of cracks by using correlation coefficient and FFT peak frequency and there were quantitative correlations between induced ultrasonic waves and size of internal cracks, and this method also could evaluate the specimens of multi-layered steels with interlayer cracks which are generated during manufacturing (Figure 1).

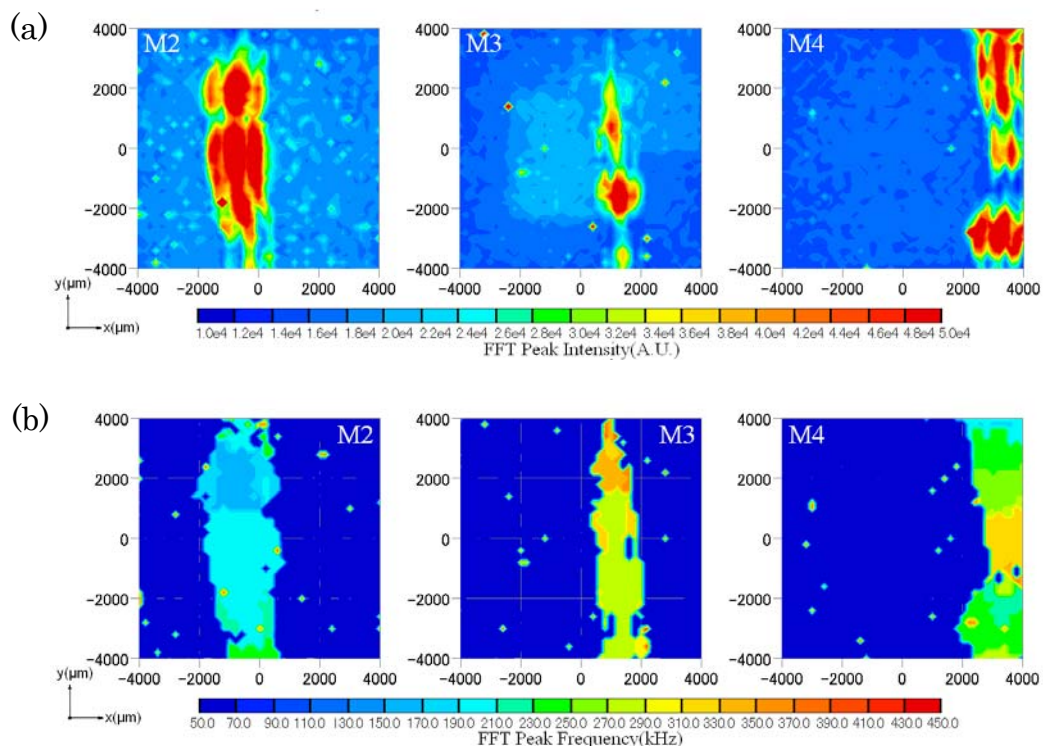


Figure 1 Evaluation of internal cracks using (a) FFT peak intensity and (b) FFT peak frequency.

References:

- [1] J. P. Monchalain, IEEE Trans. Components and Packaging Tech. 33(1986) 485-499.
- [2] K. Mori et al, NDT&E International 35 (2202) 399-406.