

Laser-Generated Surface Acoustic Wave-based study and detection of Surface Cracks

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Abstract. Monitoring cracks to check the integrity of engineering materials by Non-Destructive Testing (NDT) in industry is significant in industry. And within the NDT techniques, Laser-Generated Surface Acoustic Wave technique (LSAW) has shown to be a promising technique. To further develop non-contact and accurate testing strengths of this method, models for analyzing the generation, propagation and tracking of surface acoustic waves (SAW's) changes in S45C steel samples with distributed cracks are developed by using Finite Element Method (FEM). Time and frequency domain analyses are used to process the acoustic wave signals after the interaction with cracks. The simulation results and preliminary analyses reveal the good potential LSAW's have to monitor cracks. First results in developing an experimental setup for crack detection are also provided.

Keywords: Surface acoustic waves; time and frequency domain analysis; finite element method