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Non-contact detection of low carbon steel using laser generated ultrasound at high temperature

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Abstract: Theoretical and experimental studies on non-contact detection of high temperature metal using laser ultrasound are carried out. Based on the theory of laser ultrasound, effects of high temperature on the laser generated surface acoustic wave (SAW) are discussed. Results of simulation show that the velocity and the amplitude of SAW will decrease with the increase of the temperature. An experimental system was set up, which in a non-contact mode, by utilizing a point laser source to generate the SAW, and an interferometer to detect the SAW signal. The corresponding experimental results have verified the feasibility of the numerical simulation and the achieved result of the relationship between the velocity of SAW and the temperature. The research findings provide a potential application for online monitoring of high temperature metal.

Keywords: high temperature; laser ultrasound; surface acoustic wave; non-contact

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