

LASER THERMOGRAPHY AND IMAGE PROCESSING FOR UNDER-PAINT CORROSION DETECTION

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ABSTRACT

In this study, a line laser thermography system (LLTS) is developed for rapid and automated detection of under-paint corrosion. First, the heat energy is generated on the target structure by line laser scanning, and the corresponding heat energy propagation is measured by an infrared (IR) camera. Then hidden corrosion areas on the painted target structure are visualized based on the phenomena that the abnormal temperature fluctuation is observed near the hidden corrosion areas after the heat energy generation, due to the differences of thermal conductivities between the intact and corrosion regions. The proposed LLTS can detect the under-paint corrosion in non-contact, non-destructive and remote manner, thus, LLTS can be applied in the various fields. Also, by using the proposed LLTS, the corrosion areas can be detected using only current-state IR data with minimizing the false alarms caused by the environmental and operational variations. The effectiveness of the proposed LLTS is validated by both lab-scale and real-scale structures with successfully detecting and quantifying the hidden corrosion areas.

KEYWORDS: Corrosion detection, Baseline-free image processing, Line laser thermography, Non-destructive testing.