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ABSTRACT
PRESENTATION
PAPER

Zijun Wang is a professor and an academic researcher at the School of Aeronautics and Astronautics of the University of Electronic Science and Technology of China in Chengdu, China.

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RESEARCH ON INFRARED NONDESTRUCTIVE TESTING AND DEFECT QUANTIFICATION OF COMPOSITE MATERIALS

The comprehensive performance of composite materials is often better than that of the original constituent materials. Infrared non-destructive testing technology has the advantages of wide application range, high detection efficiency, non-contact measurement, and no coupling. It has been developed rapidly in the past 30 years and is widely used in aviation, aerospace, automotive, military, new materials research, nuclear Various fields such as industry and power system. It uses an external excitation source to actively heat the test piece, so that the internal defects of the test piece are expressed in the form of abnormal surface temperature distribution, and the surface temperature distribution changes with time are recorded in real time by an infrared thermal imager. It is transformed into an image sequence, and then a variety of analysis and processing methods are used to extract the temperature abnormal area to achieve the purpose of detecting defects in the specimen. Therefore, it is very suitable for detection and analysis of composite materials.

In this paper, combining the characteristics of composite materials, the problem of image processing and defect quantitative segmentation in nondestructive testing of composite materials is studied. The component analysis technology extracts the defect signal. In the quantitative segmentation method of defects, a two-dimensional Tsallis entropy threshold segmentation method is proposed, and the bat algorithm of chaos mapping is incorporated into it, which improves the efficiency of the algorithm. In terms of precise segmentation of defects, a new level set energy functional segmentation model is proposed. This model combines the characteristics of fuzzy clustering, Shannon entropy and point spread function to further improve the robustness of the algorithm, and finally passed Experiments verify the rationality and effectiveness of the proposed algorithm.