

Research on Ultrasonic Bulk Wave and Guided Wave Compound Detection EMAT

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In the non-destructive testing of engineering, it is always necessary to detect a variety of defects of the detection object and to use multiple testing methods such as ultrasonic bulk wave and guided wave. However, the sensors and instrument systems used in each testing method are often independent. In the detection, multiple sensors and instruments are required to complete the relevant detection processes in stages, making the detection process complicated and time consuming. Therefore, this paper develops an ultrasonic bulk wave and guided wave compound electromagnetic acoustic transducer, and proposes a compound electromagnetic acoustic detection method with combined frequency excitation to realize the function of single sensor simultaneously exciting two modes of ultrasonic to detect. Furthermore, the experimental system for electromagnetic ultrasonic bulk wave and guided wave compound detection was established. The compound detection method was experimentally studied on the simulated test block. The results show that the sensor can separately excite the ultrasonic body wave and the guided wave at different frequencies, and the compound detection of ultrasonic bulk wave and guided wave can be realized by using combined frequency excitation. This sensor and testing method lays a foundation for improving the efficiency of multi-target detection in engineering and simplifying detection instruments and equipments.