Microstructure Characterization of Metal Materials Based on Ultrasonic Microscopy

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The microstructure of metal materials is one of the important factors affecting the mechanical properties of metal materials. Commonly used methods for detecting the microstructure of metal materials include metallographic microscope, scanning electron microscope, etc. However, these methods have disadvantages such as difficulty in preparing specimens and small detection area, which limit the application of these methods. Ultrasonic microscope has the characteristics of short wavelength, good directionality and high detection accuracy, which is very helpful for characterizing the internal microstructure of materials. Therefore, high-frequency ultrasonic microscopy is used to characterize the microstructure of metal materials in this paper. First, the ultrasonic microscope is used to detect metal materials to obtain ultrasonic signals. Then, the ultrasonic relative attenuation coefficients are calculated for C-scan imaging. Finally, evaluation the distribution of microstructures in the C-scan image is performed. In order to verify the feasibility of the method, a slab specimen with sulfur segregation was used to detect by the ultrasonic microscope, and the accurate characterization of sulfur segregation can be achieved using the ultrasonic relative attenuation coefficient. Compared with the traditional experimental method, the new method can not only clearly show the distribution of the internal microstructure of the specimen, but also can distinguish the microstructure such as sulfur segregation and defects. The new method provides a new technology for the characterization of the distribution of microstructures in metal materials.