

THE X-RAY DIFFRACTION CHARACTERISTICS OF DIFFERENT MATERIALS

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Abstract: To solve the engineering problem faced when detecting residual stress of material such as stainless steel and aluminium alloy by using X-ray method, three different materials - carbon steel (Q235), stainless steel (1Cr18Ni9Ti) and aluminium alloy (LY12) were demarcated by equal intensity girder demarcating method and detected by X-ray system and electromotive method respectively when gradual loading by using a modified residual stress detecting equipment and self-edit detecting software. Then X-ray diffraction characters of different materials were obtained by comparing with theoretical values. The results shows: 1) the stainless steel appears two diffraction peaks when it is diffracted by X-ray. Although $127^{\circ}K_{\alpha}$ diffraction peak is strikingly marked, the calculated stress can't reflect the real stress according to this peak; however, although the peak back ratio of $149^{\circ}K_{\beta}$ diffraction peak is lower, it can be the basis to calculate stress. 2) Aluminium alloy also have two diffraction peaks when it is diffracted by X-ray. But for aluminium alloy, only can the 158° peak reflect the change of the stress. The experiments prove: X-ray diffraction peaks at some angles can't reflect the real change of stress which is a common problem.

Keywords: X-ray, residual stress, electromotive method, equal intensity girder demarcating, diffraction characteristic of material.