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Electron Backscatter Diffraction Technique and Its Application in Micromechanics Behavior

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Electron backscatter diffraction (EBSD) technology can not only be used to characterize the microstructure of materials, but also to qualitatively analyze the elastic and plastic strains within the tested region [1-3]. Currently, this technology has been widely applied in the microstructural characterization of crystalline materials. As the microstructure and stress state of materials may change during service [4,5], investigating the intrinsic relationship between the crystal microstructure and the evolution of strain fields under different service environments is of great significance for understanding the failure behavior and mechanisms of materials. In this paper, we first introduce the main functions of EBSD technology and describe the common methods for analyzing material microstructure and micromechanical behavior using different EBSD imaging data. Subsequently, we summarize the research progress of high-resolution digital image correlation methods based on EBSD technology. Finally, we outline the major challenges faced by the application of EBSD technology in the field of optical mechanics.

KEYWORDS

Electron backscatter diffraction (EBSD); metallic materials; strain field; fatigue behavior; microstructure

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