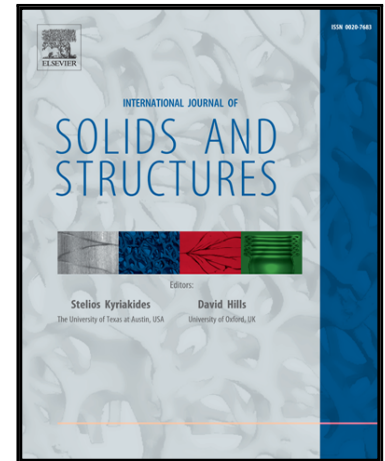


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Experimental and modelling study of fatigue crack initiation in an aluminium beam with a hole under 4-point bending

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Abstract

Slip bands and crack initiations were investigated by in-situ experiments and nonlocal CPFEM simulations systematically. Experimental techniques including EBSD, digital image correlation (DIC) and SEM have been used to obtain consistent grain orientations, local strain, as well as slip bands and microcracks in the same area of the sample surface. The realistic microstructure based on EBSD map has been generated and used for finite element modelling. An advanced nonlocal crystal plasticity model, which considers the isotropic hardening and kinematic hardening of plastic strain gradient, has been adopted. The simulation results match experimental results well from many aspects. It was found that total strain and averaged slip on slip

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