A CRYSTAL PLASTICITY STUDY OF THE MICROMECHANICS OF INTERFACES IN TiAl

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Submicron resolution deformation mapping techniques implemented into both micro and macro mechanical testing have recently provided measurements of the deformation of titanium aluminide at the microstructural scale. Experimental observations indicate that damage in such alloy strongly depends on the way shear localization associated with slip bands or twins is accommodated at the interface between colonies. Here, crystal plasticity finite element analysis has been carried out to simulate the relevant micromechanics. It is shown that it is possible to capture the deformation patterns observed at colony boundaries, therefore providing trustworthy predictions of the associated stress field. Different conditions are explored for which a given imposed deformation can be achieved with minimum stress concentration. The implications for microstructure engineering aimed to delay the nucleation of damage in such alloy are discussed.