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Plasticity in Matrix Dominated Metal-Matrix Composite with One Active Slip Based Dislocation

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Abstract : The main aim of this paper is to suggest one active slip based continuum dislocation approach to matrix dominated MMC plasticity analysis. The approach centered the free energy principles through the continuum behavior of dislocations combined with small strain continuum kinematics. The analytical derivation of this method includes the formulation of one active slip system, the thermodynamic approach of dislocations, determination of free energy, and evolution of dislocations. In addition zero and non-zero energy dissipation analysis of dislocation evolution is also formulated by using varational energy minimization method. In general, this work shows its capability to analyze the plasticity of matrix dominated MMC with inclusions. The proposed method is also found to be capable of handling plasticity of MMC.

Keywords : active slip, continuum dislocation, distortion, dominated, energy dissipation, matrix dominated, plasticity
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