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Modeling Martensite Transformation in the Elasto-Plastic Material at Finite Strain

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In this paper, a model of martensitic transformation in TRIP steel was established in the framework of the continuous mechanics and thermodynamics at a large strain. The model is based on the concept of a laminated microstructure composed of the martensitic plate and austenite layer. The internal structure of the martensite and austenite composite is variable and changes with moving interface. The model includes the essential features of the deformation induced martensitic transformation and provides a local kinetics description of martensite growth. A distinctive feature of the current model is that each phase is characterized by its own material constitutive model, and therefore, the evolution of the stress in both phases as the martensite transformation proceeds under a given deformation gradient can be properly predicted.

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