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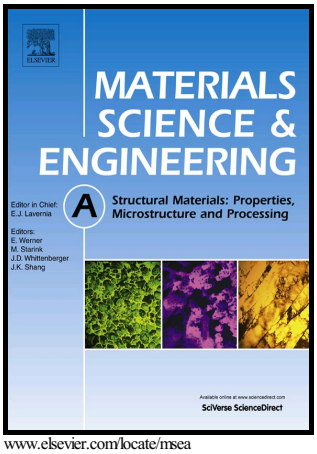

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Virtual testing of dual-phase steels: Effect of martensite morphology on plastic flow behavior

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Abstract

Dual-phase steels exhibit a moderate plastic anisotropy as a result of the underlying microstructure. A numerical homogenization scheme based on full-field finite element simulations was applied to assess the effect of the martensite morphology on the stress-strain curves and the plastic strain ratios (r-values) of a dual-phase steel under uniaxial tensile loading in different directions. The simulation results show that the martensite morphology affects the macroscopic response and the degree of plastic anisotropy. The mechanical behavior of the dual-phase steel (DP600) investigated in this work could be predicted if the crystallographic texture of the material and a statistically equivalent martensite morphology were considered in the simulations. The corresponding finite element models of the dual-phase microstructure were generated using a reconstruction procedure based on statistical correlation functions. This study demonstrates that the predictive capabilities of

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