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Is there TRIP effect? Verification from finite element simulation

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ABSTRACT

Since Zackay et al. proposed the transformation-induced plasticity (TRIP) effect in 1967, abundant researches focus TRIP steels and the mechanism of TRIP effect in near 50 years. Just as its name implies that the martensitic transformation (MT) of retained austenite during deformation will raise the plasticity of steels, in other words, if retained austenite keeps stable and the MT does not occur during deformation, the plasticity of steels will decrease. For the sake, we propose proposition that TRIP effect does not exist verified by finite element simulation. The simulation results indicate that the elongation of steel with infinite critical stress of martensitic transformation resulting in MT does not occur during deformation is higher than that of steel with experimentally critical stress in the condition of the same fracture stress, which theoretically verifies the correctness of the proposition: no TRIP effect exists.

KEYWORDS: transformation-induced plasticity (TRIP) effect, strain-induced martensitic transformation, critical stress of martensitic transformation, elongation, finite element simulation