عنوان مقاله:

Micromechanical modeling of dual phase steel using representative volumeelements based on actual microstructure

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خلاصه مقاله:

Dual phase (DP) steels are among the advanced high strength steel (AHSS) products recently developed for the automotive industry. Due to their high strength and good formability, this group of steels is used in the automotive industry for complex and high strength parts. The microstructure of DP steel basically consists of a matrix of ferrite embedded by martensitic islands. In the past, many methods have been used to analyze dual phase steels, but these theories are based on the assumption of uniform deformation throughout the constituents, neglecting the local strain gradients. This assumption contradicts the experimental observations and reduces the understanding of the mechanics and mechanism of deformation of such materials.In this paper, the C–Mn steel specimens with 0.2% carbon were put under intercritical annealing treatment (ICT) at 765°C and quenched in water to obtain 25% martensite. After metallographic analysis an actual microstructure of the dual phase steel is obtained by optical microscopy. A 2D Representative Volume Element (RVE) was generated by FE code Ansys on the basis of an actual microstructure which was obtained by image processing code in Matlab software. The individual single phases flow curves was obtained based on dislocation theory and local chemical composition of constituent. Both of the periodic and symmetric boundary conditions were imposed on RVE. The micromechanical results were compared with the experimentally obtained data. It is shown that the micromechanical modeling can predict both strength and ductility of the investigated dualphase steel. The micromechanical modeling may then be used to portray the local stress and strainevolution of the individual phases in the DP microstructures.

کلمات کلیدی:

Dual phase steel, microstructure, micromechanical modeling, mechanical behavior

لینک ثابت مقاله در پایگاه سیویلیکا: