

Yield surface determination of CP-Ti and its evolution reflecting prior deformation under complex loading

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ABSTRACT

Uniaxial testing methods to characterize materials provide only limited data that is insufficient to fully understand all aspects of their behaviour, such as initial texture or anisotropy. Therefore, this research aims to conduct complex stress loading experiments to understand the physical mechanism accountable for plastic deformation caused by monotonic tension and tension assisted by proportional cyclic torsion in the CP-Ti (Commercially Pure Titanium). The yield surface approach was applied to assess the variation of mechanical properties in the as-received and pre-deformed material. It was found, that such monotonic tension associated with cyclic torsion caused a significant decrease of the tensile stress. The initial yield surface obtained for the as-received material exhibits anisotropic behaviour, whereas, the sizes of subsequent yield surface reflecting prior deformation were reduced in all directions with exception of the tension direction.

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