

Microstructure Evolution and Material Properties Variation Mechanism of Austenitic Stainless Steel under Pre-strain

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Abstract

In the present study, the microstructure evolution and material properties variation mechanism of austenitic stainless steel under pre-strain were discussed. A bilinear relationship between material properties and pre-strain was established. Both yield strength and tensile strength of the austenitic stainless increase with the increase of pre-strain, but the increment of yield strength is obviously greater than that of the tensile strength. A critical pre-strain point was put forward. When the pre-strain is lower than critical value, there is only work hardening. And when it is higher than critical value, the material properties are affected by the combined effects of work hardening and martensitic transformation. The effect of critical pre-strain is also found in the study of fatigue limit. The inherent essence of fatigue limit improvement of pre-strained material lies in the comprehensive effect of material phase transformation and plastic deformation strengthening.

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