Impact Tensile Mechanical Properties of 316L Stainless Steel at Different Strain Rates

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Abstract : 316L stainless steel has good mechanical and technological properties, has been widely used in shipbuilding and aerospace manufacturing. In order to understand the effect of strain rate on the yield limit of 316L stainless steel and the constitutive relationship of the materials at different strain rates, this paper used the INSTRON-4505 electronic universal testing machine to study the mechanical properties of the tensile specimen under quasi-static conditions. Meanwhile, the Zwick-Roell RKP450 intelligent oscillometric impact tester was used to test the tensile specimens at different strain rates. Through the above two kinds of experimental researches, the relationship between the true stress-strain and the engineering stress-strain at different strain rates is obtained. The result shows that the tensile yield point of 316L stainless steel increases with the increase of strain rate, and the real stress-strain curve of the 316L stainless steel has a better normalization than that of the engineering stress-strain curve. The real stress-strain curves can be used in the practical engineering of impact stretch to improve its safety.

Keywords : impact stretch, 316L stainless steel, strain rate, real stress-strain, normalization

Conference Title : ICTAM 2018 : International Conference on Theoretical and Applied Mechanics

Conference Location : Rome, Italy

Conference Dates : September 17-18, 2018