

Energy Storage Rate in Non-Homogeneous Deformation

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The energy storage rate, defined as the ratio of the stored energy increment to the plastic work increment, versus strain are experimentally estimated in the range of homogeneous deformation as well as in the range of non-homogeneous one. It has been shown, that during straining the material reaches the state at which the energy storage rate is zero and after that it is negative. This means that a part of energy stored during previous deformation begins to release. It has been found that the point where the energy storage rate is zero corresponds to the point of Considère stability criterion. Therefore the release of stored energy could be used as an indicator to describe the progressive predominance of damage leading to the fracture of material. This confirms Considère construction that specimen will undergo stable deformation up to the point on the stress-strain curve for which the strain hardening rate is equal to the flow stress.

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