Damage and Failure of Thin Sheet Metal: New Biaxial Specimen Geometries

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ABSTRACT

The presentation deals with new biaxial specimen geometries for thin metal sheets. Due to sheet thicknesses of maximal 1mm the presented geometries avoid notches in thickness direction. Purpose of this geometries is the calibration of the proposed phenomenological continuum damage and failure model.

Introductorily the applied continuum damage and failure model [1] in its applied form is presented. The damage and failure processes mainly depend on the stress state which can be characterized by the stress triaxiality, the Lode parameter and the stress intensity. In continuation different uniaxial [2, 3] and biaxial [4, 5, 6] specimen geometries are discussed and the new biaxial geometries for thin sheet metal are motivated. These can be applied for a wide range of different stress states in a well-controlled way. The main part of the presentation focusses on numerical simulations and corresponding uniaxial and biaxial experiments with different materials. Special attention is given to challenge of strain localization without notches in thickness direction.

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