

**ADVANCES IN DUCTILE FAILURE**

**A. NEEDLEMAN<sup>\*</sup>, A. BENALLAL<sup>^</sup>, A.A. BENZERGA<sup>†</sup>,  
AND D. MORIN<sup>+</sup>**

<sup>\*</sup> Department of Materials Science and Engineering  
Texas A&M University  
College Station, TX 77843 USA  
[needle@tamu.edu](mailto:needle@tamu.edu)

<sup>^</sup> LMPS  
Paris Saclay University  
Gif-sur-Yvette, France  
[benallal@ens-paris-saclay.fr](mailto:benallal@ens-paris-saclay.fr)

<sup>†</sup> Department of Aerospace Engineering  
Texas A&M University  
College Station, TX 77843 USA  
[benzerga@tamu.edu](mailto:benzerga@tamu.edu)

<sup>+</sup> Department of Structural Engineering  
NTNU  
Trondheim, Norway  
[david.morin@ntnu.no](mailto:david.morin@ntnu.no)

**ABSTRACT**

The focus of this invited session is on recent advances in the ductile fracture of materials with an emphasis on non-proportional loading histories, complex matrix behaviors and complex void morphologies. Experimental, theoretical and computational contributions are welcome as, especially, are contributions that combine two or more of these modes of investigation. Experimental contributions of particular interest concern the physical mechanisms of ductile fracture under non-proportional loading paths at various strain rates and their interaction with localized plastic flow. Qualitative as well as quantitative studies of these mechanisms using modern experimental facilities are especially welcome. Ductile fracture modeling issues of particular interest are: the competition between ductile damage accumulation and localization phenomena to understand and model shear failure; the role of material anisotropy; and the role of material heterogeneities. Numerical method advances are also of interest, particularly numerical implementations of constitutive formulations aimed at providing objective predictions of ductile failure and numerical procedures for material parameter identification.