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DYNAMIC DAMAGE MODELLING FOR COMPOSITE MATERIALS AND STRUCTURES

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ABSTRACT

Composites materials fund increasing applications in many industrial sectors, such as aerospace, automotive and renewable energy, and many of these applications face challenges against dynamic loading and impact from foreign objectives. The anisotropic and non-homogenize nature of composites, complicated with features from different manufacturing processes, make dynamic failure of composite materials and structures a complex of multiple failure modes, including the fracture within each component and the interface among them. Besides, strain rate effects may arise in materials, manifest in terms of the change of failure mode as a function of loading rate. Experimental investigation of such damage event can be expensive and time consuming. Numerical modelling provides an alternative yet potentially efficient way to analyse the dynamic fracture of composite structures. Many successful numerical models have been proposed, although there are remaining issues that limit the accuracy and reliability of their predictive capabilities.

This minisymposium provides a just timely opportunity to share our latest progresses in dynamic failure modelling of composites, as well as an open forum to discuss challenges involved in this field. The following topics are suggested here:

1) Constitutive model and its strain-rate dependency, including all major failure modes of composite materials;

2) Environmental effect in the dynamic damage modelling of composites, such as heat and moisture;

3) Computational efficient methods for dynamic failure modelling of large-scale composite structures;

4) Advanced numerical methodology for complex damage initiation and growth in composites.