MODELING OF MANUFACTURING AND MATERIAL PROCESSING WITH PARTICLE METHODS (including PFEM, SPH, DEM…)

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ABSTRACT

This Invited Organized Session aims to bring together researchers and scientists to present recent advancements in mathematical formulations, numerical methods, computational techniques, and their industrial applications. The focus is on **Computational Modeling of Manufacturing and Material Processing using Particle Methods**, including PFEM, SPH, DEM… and more.

The goal is to advance in the formulation and resolution of both fundamental theoretical challenges and practical real-world problems. This includes all complex phenomena involved in the physical description of the problem considering a multidisciplinary approach.

Invited session topics on computational modeling of manufacturing, materials processing and large deformation processes in the broad sense will include, but are not limited to:

- ✓ PFEM, DEM, SPH, MPM, LBM, FCM, EFG… i.e. any particle or meshless discretization methods
- ✓ Simulation of manufacturing processes, such as additive manufacturing, solidification, forging, rolling, stamping, extrusion, deep-drawing, cold rolling, leveling, superplastic forming, thixoforming, casting, welding, friction stir welding, friction melt bonding, high speed forming, metal deposition, etc.
- ✓ Mathematical formulations
- ✓ Numerical methods
- ✓ Solution strategies and numerical implementation issues
- ✓ Multiscale and stabilization techniques
- ✓ Nonlinear constitutive modeling across macroscale, mesoscale, microscale and/or multiscale, including also high strain rate and high temperature scenarios
- ✓ Contact mechanics, friction and lubrication
- ✓ Damage models and crack propagation
- ✓ Coupled thermomechanical and metallurgical models
- ✓ Simulation of chain manufacturing processes
- ✓ Large scale simulation and high-performance computing