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ADVANCED MODELLING AND SIMULATION FOR POLYMERS

300 - MULTISCALE AND MULTIPHYSICS SYSTEMS

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ABSTRACT

This symposium focuses on the latest developments around the complex multiphysics behavior of polymers. These materials can exhibit strongly coupled effects such as strain induced crystallisation, diffusive-reactive phenomena due to the environment, strong self-heating, thermal ageing, etc. Polymers can also be designed to respond to external stimuli such as the ambient temperature, an electric or a magnetic field, light, etc.

Such phenomena are deeply related to the mechanical state and/or strongly influence the properties of the material. The numerical simulation of these strongly coupled problems leads to computational challenges to simulate real applications due to the spatial/time scales involved and the complexity of the material behavior (finite strain, incompressibility, non-linear viscoelastic behavior, ...).

The topics covered include (but not limited to):

- Numerical modelling of themo-mechanical or thermo-chemo-mechanical couplings;
- Advanced algorithms for the integration of coupled evolution equations;
- Network models and numerical scale changing strategies to account of physical aspects of amorphous or semi-crystalline structure of the material;

- Alternative numerical methods (mesh-free or discontinuous Galerkin methods, isogeometric analysis, molecular dynamics, etc) in a multiphysics context;
- Specific time integration schemes (high order schemes in space and time, ...)