Postdoctoral Position 2 – Modeling the Viscoelastic Behavior of Foams under Large Cyclic Compressions and Dynamic Loading

Duration: 12 months

This postdoctoral project aims to the viscoelastic behavior of polymeric foams under large deformations dynamic loadings.

The objective is to simulate, using the finite element method, the response of these porous microstructures under complex loading conditions, including compression–relaxation tests and cyclic loading–unloading. A first stage will focus on analyzing the relationship between the viscoelastic properties of the base polymer and the macroscopic response of the foam, in order to identify the mechanisms governing energy dissipation and hysteresis.

These results will then support a second phase dedicated to the study of dynamic behavior, in particular during impact scenarios such as the rebound of a quasi-rigid ball on the foam. Depending on the scale considered, simulations may be performed either on explicitly modeled representative microstructures or using an equivalent homogenized material model.

The project therefore combines multi-scale modeling, large deformations, nonlinear viscoelasticity, and transient dynamics.

Candidate Profile

The successful candidate should have:

- Solid experience in finite element modeling of the mechanical behavior of materials,
- Good knowledge of large deformation mechanics (strongly appreciated),
- Background in viscoelasticity (linear and/or nonlinear) would be a significant asset,
- Interest in multi-scale approaches and dynamic simulations.

Supervision

The postdoctoral researcher will be supervised by **Julie DIANI** and **Kostas DANAS**, CNRS Research Directors at the LMS (Laboratoire de Mécanique des Solides), specialists in full-field

modeling of polymeric, reinforced, and porous materials, with strong expertise in large deformations and numerical homogenization.

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Industrial partner: Arkema (Cerdato)