

Open doctoral position

Mechanics of shape memory alloys under extreme dynamic environments

An open doctoral position is available in the area(s) of experimental mechanics and dynamic behavior of materials, within the [Solid Mechanics Laboratory \(LMS\)](#), [École Polytechnique](#), Palaiseau, France.

Description

Shape Memory Alloys (SMAs) are a class of active materials which exhibit “pseudo/super elastic” mechanical response, elasto/baro-caloric cooling, and mechanically-driven magnetic flux (for a special class of magnetic SMAs) — with applications ranging from impact damping to power generation. At the microscopic length scales, these phenomena occur due to spatially-heterogeneous structural changes in the atomic lattice — phase transformations — driven by mechanical, thermal and magnetic fields.

This doctoral thesis will involve design and development of Kolsky bar experiments with high-speed instrumentation, to study the macroscopic response and evolution of phase boundaries in magnetic SMAs under high strain rates and multi-axial stress states. The resulting data sets will be used to discover the kinetics of phase transformations, and their effect on multi-physical coupling under dynamic loading conditions. The successful candidate will work under the direct supervision of Prof. Vignesh Kannan, and will be co-supervised by Prof. Eric Charkaluk (CNRS, École Polytechnique).

Your profile

- A masters degree in mechanical engineering, materials science, or any related field
- Strong background in continuum mechanics and experimental mechanics
- Experience in mechanical characterization of materials, optics and instrumentation
- Experience with high-strain-rate experiments is an advantage, but not a necessity
- You like working in multi-disciplinary environments at the interface of mechanics and materials science.
- You are comfortable communicating in English, and enjoy working in an international environment.

Finally and most importantly, if you are passionate and eager to study mechanics, develop experiments, and enjoy doing science, you are eligible to apply!

Application documents

- Curriculum vitae (max. two pages)
- Letter of motivation (max. two pages)
- Official detailed transcript records (bachelor and masters)
- Name, designation and contact details of at least two referees

Please send your application via e-mail to Prof. Vignesh Kannan (vignesh.kannan@polytechnique.edu) with the subject **"Application-PhD-SMA2024"** (please do not forget the subject!). Applications will be accepted until **Sunday, 03 November, 2024 at 1800 hrs (Central European Time)**.

About our group – [Mechanics and Materials under Extremes](#)

Our group studies the mechanics of materials and structures under large, multi-physical fields and short time scales. We use mechanical design, electronic and optical instrumentation to push the cutting edge of experimental mechanics down to nano-second time scales, and μm length scales. Our experiments are motivated by theoretical foundations, with the goal of understanding fundamental mechanisms that govern the multi-physical response of materials. We continuously seek to develop a collaborative, supportive and international group of scientists who enjoy the pursuit of exciting problems, and each other's company!