Post-Doctoral opening in Multi-physics simulation of hydrogen diffusion in polymers/composites

Composites Lab - KAUST

The Division of Physical Sciences and Engineering at King Abdullah University of Science and Technology (KAUST), Saudi Arabia, invites applications for Postdoctoral fellow in Mechanical Engineering at the Mechanics of Composites for Energy and Mobility Lab. (MCEM, https://composites.kaust.edu.sa).

Field of study

A Post-doctoral opening is available in the area of engineered thermoplastic composite tanks.
Hydrogen storage is an essential step of the entire hydrogen chain. Owing to their light weight, high specific strength, good fatigue response, and dimensional stability, the use of fiber-reinforced plastic pressure vessels for hydrogen storage has definitely been on the rise. Despite these advantages, the current tanks have several issues regarding the liner, such as cavitation and blistering, and others related to the tank walls, such as hydrogen leaks through cracks. These challenges renders the fast progress in the hydrogen market.

The project aims to contribute to this global effort by solving essential challenges faced by the current storage and transportation technologies, to which we believe adequately engineered and designed thermoplastic carbon fiber technology can be beneficial.

The project will be organized around 3 main activities:

- Understanding/simulating the diffusion paths and cavitation in thermoplastic liners.
- Multi-physics simulation of the diffusion process in thermoplastic orthotropic composites.
- Understanding the rabid gas decompression damage modes and their influence on the integrity of the liners.

Qualifications

The successful candidate must hold a Ph.D. in Mechanical Engineering, Material Science, or other relevant discipline. He/She must have a strong background in one or more of the following fields: **Multi-physics simulation, fracture, damage mechanics, and polymeric materials. The candidate should also have a good knowledge of testing at extreme conditions, high pressure, and temperatures is a plus.** For any appointment at MCEM, an in-depth knowledge of theoretical mechanics is a firm requirement.

A high level of self-motivation, a strong publication record, and a good command of oral and written English, the ability to work in a team, as well as alone, and good organizational skills are essential.

Other duties

The Post-doctoral fellow will be actively engaged in student mentoring (directed research, Masters thesis students). He/She will also be in charge of developing further the facilities of the laboratory. The candidate will

also be in charge of delivering regular reports related to the associated grant.

Appointment

One year renewable up to three years by mutual agreement. The candidate is expected to join the team as soon as a successful interview has been completed.

Benefits

In addition to a competitive salary, the successful candidate will enjoy a generous benefits package, including medical insurance, on-campus housing facilities, K-12 schools, and outstanding recreational facilities.

Application Requirements

Only applications providing all requirements will be considered further.

Applicant requirements are as below. They should be numbered and attached to the application in the following order:

1. Detailed CV including list of publications, awards, with the potential start date.

2. A short statement of previous work, title of the post-doc fellowship you apply for, and a description of your vision and of your research plan on that field (the document does not need to be extensive - no more than one A4 page – but should be very high quality. It should clearly highlight a vision of the candidate in the field, a prior understanding of the related literature, and the definition of key steps towards innovative results in the field. Special care should be given by the candidate to this document, which is a key element of the decision process towards recruitment).

3. Names and contact information of three referees.

4. Slides from a recent presentation in a conference or seminar.

5. PDF of a recent publication considered by the candidate as being representative of his research work.

Interested applicants should send their complete application package to Prof. Gilles Lubineau (gilles.lubineau@kaust.edu.sa) (With a systematic cc to khathijah.osman@kaust.edu.sa and ahmed.abdelhady.1@kaust.edu.sa).

PLEASE USE this as the subject of your email: **Post Doc MCEM23– Simul-H2.**

Note: Applicant will be evaluated on a rolling basis and closed as soon as the position is filled.

About KAUST and the MCEM laboratory

The **Mechanics of Composites for Energy and Mobility Laboratory** (Composites Lab) is located at King Abdullah University of Science and Technology and is part of the Physical Science and Engineering Division. The Composites Lab started at KAUST in 2009 and is an integrated environment for composite science, combining modeling and experimental expertise in a single working environment.

OUR MISSION: Support Energy transition by providing innovative composite solutions or optimizing the usage of existing solutions in demanding Energy and Mobility applications.

Our laboratory expertise incorporates three main areas:

Design of materials in representative environments of energy applications: In-situ testing facilities and characterization techniques (Generation of unique databases on well-identified frames), validated models in operational conditions (New models based on real in-situ observations and mechanism).

Microstructure manipulation for tailoring macroscopic response: Toughing mechanism using surface on in-volume spatial variations.

Structural health monitoring (SHM) and smart structures for composite infrastructures: Wireless surface gauges and integrated sensors, SHM/NDT/Inline/Online.

A project at the Composites Lab is characterized by the amalgamation of experimental and computational/modeling mechanics and encompasses people with very different backgrounds to ensure we capture all aspects of these complex problems. In the Composites Lab, you will find skills ranging from theoretical mechanics, applied mathematics, and computer science to material science and chemical engineering. Our researchers are connected by their common passion for the fascinating potential of composite materials.

The Composites Lab develops and authenticates techniques to achieve better designs of composite material-based structures. Much of this research is done in close cooperation with major industrial partners. This ensures a high level of applied research based on advanced theoretical concepts.

Dr. Gilles Lubineau
Principal Investigator of Mechanics of Composites for Energy and Mobility
Professor of Mechanical Engineering