

Generalized Nonlocal Mechanics to Local Continuum Mechanics for Objective Simulation of Material Failure

Introduction

The Division of Physical Sciences and Engineering at King Abdullah University of Science and Technology (KAUST) invites applications for a PhD Student in Mechanical Engineering at the Composite and Heterogeneous Material Analysis and Simulation Laboratory (COHMAS).

We seek a highly motivated candidate who will be involved in coupling the non-local mechanics (for example, peridynamics) with the classical (local) continuum mechanics for objective simulations of material failures, which involve the damage and the macro-fracture. The end goal is to develop the computational model and method to simulate the whole process of material failure including damage initiation, damage evolution, macro-crack formation and propagation until the final fracture of structure. The key words relating to the PhD are: large-scale computing, local/nonlocal coupling method, peridynamics, damage mechanics and fracture mechanics. At the end of this PhD activity the student should have built a computation tool to effectively simulate material failures and have deeply understood the different dissipation mechanisms on damage and fracture and their interactions between each other.

Please contact us for a further description of the project.

Qualifications

The successful candidate must hold a Master of Science degree in Mechanical Engineering, Applied Mathematics or Computer Science. A strong background in theoretical mechanics (continuum mechanics, up scaling techniques, mechanical behavior of engineering materials), applied mathematics and high performance computing is expected.

Only students with excellent grades and demonstrated English language proficiency need apply. The ideal candidate must have a minimum of B+ average and must have passed the TOEFL examination.

Appointment

The candidate will be expected to start as soon as possible. However, applications will continue to be considered until the position is filled.

Benefits

KAUST is a new University located on the shores of the Red Sea in a western-style "campus-city" in Saudi Arabia. The community has many things to offer including: housing, healthcare, shopping, dining, movie theatres, and many parks and sport facilities (including world-class golf course, sailing facilities, water skiing, fishing, gym facilities with swimming pools, soccer fields, basketball fields, running tracks, etc). The campus has a public transport system which is excellent and free.

Advertisement

PhD Candidate

The university research facilities include the seventh fastest supercomputer “Shaheen XC40” in the world (according to the TOP500 list announced on July 13, 2015, at the International Supercomputing Conference in Frankfurt, Germany) and the extensive world-class nanofabrication and characterization facilities, including a fully-equipped class 100 clean room, central imaging and characterization facilities, and several focused research centers.

Application Requirements

If interested, please provide us with your CV including all grades relating to your graduate and undergraduate studies. Interested applicants should send their complete application packets to:

COHMAS administrator

Xianhou Nie

xianhou.nie@kaust.edu.sa

Please copy (cc:) all applications to:

Dr. Fei Han (fei.han@kaust.edu.sa) and

Prof. Gilles Lubineau (gilles.lubineau@kaust.edu.sa)

Please use as subject for your email: PhD – Simulation of Material Failure

About KAUST and the COHMAS laboratory

The Composite and Heterogeneous Material Analysis and Simulation Laboratory (COHMAS) is located at the King Abdullah University of Science and Technology and forms part of the Physical Science and Engineering Division.

COHMAS develops and validates techniques to achieve the better design of composite materials based structures (The more information can be found in <http://cohmas.kaust.edu.sa>). Our general research activities cover:

- Multiscale damage modeling in composites: micromechanics, mesoscale damage mechanics for structural application, molecular mechanics, homogenization
- Computational strategies for multimodel problems: gluing techniques between models at different scales
- Inverse problems for the identification of material parameters based on full-fields measurements and computed tomography
- Mechanics of multiscale reinforced composites: nanoreinforced materials, carbon nanotubes, carbon nanofibers
- Aging and degradation of composite structures submitted to severe environmental conditions

Every project we undertake seeks to develop an integrated approach to material analysis including advanced experimental characterization, advanced modeling and simulation.