

## JOB OFFER

### Research engineer

### Numerical simulation in damage & fracture mechanics

Cenaero, located in Gosselies (Belgium), is a private non-profit applied research center providing to companies involved in a technology innovation process numerical simulation methods and tools to invent and design more competitive products. Our ambition is to be internationally recognized as a technology leader in modeling and numerical simulation, to be a strategic partner of large global industries as well as a real support to regional companies including innovative SMEs.

Cenaero provides expertise and engineering services in multidisciplinary simulation, design, and optimization in the fields of both mechanics (including fluid, structure, thermal, and acoustics) and electro-magnetics, manufacturing of metallic and composite structures as well as in analysis of in-service behavior of complex systems and life prediction. It also provides software through its massively parallel multi-physics platform Argo, its manufacturing process simulation and crack propagation platform Morfeo and its design space exploration and optimization platform Minamo. Cenaero operates the Tier-1 Walloon supercomputing infrastructure, named Lucia, of a capacity close to 4 Pflops on a mixed CPU and GPU architecture.

To support the expanding research activities in **damage & fracture mechanics**, Cenaero is currently looking for a **research engineer** (M/F). This permanent position is available immediately.

#### Position

Numerical tools and methodologies for advanced simulation of damage and fracture mechanics, in particular robust 3D crack propagation simulations, are being developed at Cenaero for different purposes: crack path prediction to avoid critical areas, crack growth rate to get information on lifetime, localization of potential crack initiation, study of damage evolution, influence of upstream manufacturing process (AM, welding) on fatigue life. Fracture mechanics simulations are based on XFEM numerical method to compute Stress Intensity Factors (LEFM) or J-Integral (EPFM). Metallic components are the mainly studied materials, but application to concrete, composite and additive manufactured parts are becoming more and more important.

The successful candidate will strengthen the lifetime prediction activities at Cenaero in the context of collaborative research projects and industrial contracts at both Regional, National and European levels. Leveraging external and in-house numerical codes as well as large-scale HPC resources, he/she will develop methodologies involving advanced numerical tools to simulate damage and cracks evolution for aeronautical, nuclear and/or railways applications. He/she will interact with numerical experts at Cenaero to improve in-house simulation tools and with application specialists to deliver solutions of industrial relevance. He/she is also expected to contribute to the growth of research and service activities by setting up new collaborative research projects and industrial contracts.

#### Profile

##### **Required qualifications:**

- Hold a PhD degree in Mechanical Engineering or related disciplines.
- Have a solid background in:
  - Computational mechanics, in particular Damage and Fracture mechanics.
  - Fatigue of materials (metals, composites, concrete), including multi-scale approaches.
  - Numerical methods (FEM; X-FEM), mesh regularization methods for damage mechanics.
- Demonstrate substantial experience (either academic or industrial) with:
  - Different pre- and post-processing tools for structural mechanics.

- Large-scale simulations in an HPC context.
- Scripting and programming (Python, Linux shell...).
- Have excellent analytical skills and a solution-oriented thinking capacity.
- Be fluent in English with effective communication skills (both written and spoken).
- Be a team player yet have a proactive and autonomous attitude.

#### **Additional qualifications**

- Numerical simulations to set-up an experimental campaign.
- Experience in the development of numerical methods for computational mechanics:
  - (eXtended) Finite Element Method.
  - C++ programming language.
- Fluency in French.

#### **Offer**

Cenaero offers a position in growing and leading technological sectors, a direct relationship with their business actors and technical experts, a competitive salary package and a stimulating and dynamic work environment. The successful candidate will benefit from outstanding supercomputing capacity with a brand-new Tier-1 facility at regional level and the possibility to access one of the most powerful supercomputers in the world through the LUMI consortium, in which Belgium has a significant share.

#### **Application procedure**

Interested candidates should send a cover letter, quoting the reference number of the offer (BE-JO-2023-06) and a resume to [rh\\_be-jo-2023-06@cenaero.be](mailto:rh_be-jo-2023-06@cenaero.be).