

### **OPEN CALL – PhD position**







#### Host (recruiting) organisation

Université libre de Bruxelles (ULB), Brussels, Belgium

# Project Title: Robust modelling of 3D composite materials for aeronautical applications

#### Supervisory team

Primary academic institution	Industrial institution
Prof. Thierry J. Massart	Charles Chary
Université libre de Bruxelles (ULB)	Sonaca
Secondary academic institution	
Prof. Marc Geers	
Dr. Joris Remmers	
Eindhoven University of Technology	

#### **Project description**

SONACA, an aerospace company, has as core business the development, manufacturing and assembly of aerospace wing and fuselage structures and their associated subsystems. Sonaca is also actively involved in aerospace applications with the development of innovative composite solutions for space launchers using the most advanced 3D orthogonal weaving reinforcements. The development of robust modelling tools to assess the strength and lifetime of composites, allowing to optimize their production process, is therefore of particular interest.

The simulation of the behaviour of textile and 3D reinforced composites is scientifically challenging because: (i) it involves a complex local material behaviour of the phases (plasticity, cracking, decohesions), with complex and intricate microstructural geometries, (ii) the problem is intrinsically multi-scale with the smallest scale being that of the constituents and the largest scale the scale of the produced part, (iii) the manufacturing process involves multi-physical couplings that may induce cracking and that influence the behaviour of the produced parts and their lifetime.

These scientific challenges will be addressed in this project with the following targets: (i) the set-up of microstructural geometries descriptions and discretization dedicated to 3D composites, (ii) the development of material models that couple thermo-mechanical effects



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of both curing and mechanical degradation to model the manufacturing of the composite, and (iii) the development of a multiscale methodology to derive macro-scale constitutive models based on the upscaling of micro-structural models.

#### **Benefits**

- Double doctorate degree from the Université libre de Bruxelles and the Eindhoven University of Technology
- Integration within an aerospace industrial lab
- 48 month full-time PhD grant
- Additional mobility and family allowances if applicable
- Research supervision and training by recognised experts in computational mechanics from academia and industry
- Access to state-of-the-art research and computing facilities
- Training in transversal skills (e.g. communication skills, entrepreneurship)

#### **Prerequisites**

- To have a strong undergraduate and MSc degree (or equivalent) in Engineering, Mathematics, Physics or a related field and a good level of English
- To have an enthusiastic attitude to conduct research, being hard worker and self-critical
- To demonstrate knowledge of some programming languages such as Matlab and Fortran
- To have some experience with Nonlinear Solid Mechanics and Finite Element analysis
- Outstanding grades at MSc level

#### Eligibility

Applicants shall, at the time of recruitment by Université libre de Bruxelles, be in the first four years (full-time equivalent research experience) of their research careers and have not been awarded a previous doctoral degree. Full-Time Equivalent Research Experience is measured from the date when a researcher obtained the degree, which would formally entitle him/her to embark on a doctorate, irrespective of whether or not a doctorate is or was ever envisaged.

At the time of recruitment by the host organisation, researchers must not have resided or carried out their main activity (work, studies, etc.) in Belgium for more than 12 months in the 3 years immediately prior to the reference date.

### **Duration of the project**

The total duration of the project is 48 months.

#### **Obligations of ESRs**

- Completion of the Joint PhD programme Simulation Engineering and Entrepreneurship Development (SEED)
- Be highly committed to quality research, training and management. The successful candidate is expected to become a future leader on the development and application of advanced computational methods for industry
- Take part in the mobility programme both in academia and industry
- Participate in the dissemination and outreach activities associated to the project
- Attend international conferences and present the research undertaken
- Contribute to the writing of articles in high impact international journals



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## **Closing date** Until position is filled

How to apply www.lacan.upc.edu/ProTechTion

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