

ANNOUNCEMENT

Marie Skłodowska-Curie ITN

1 Early Stage Researcher Post in New strategies for multifield fracture problems across scales in heterogeneous systems for Energy, Health and Transport - NEWFRAC

Applications are invited to work with Prof. Pedro Camanho and Prof. Albertino Arteiro in the framework of the European Training Network (ETN) for **New strategies for multifield fracture problems across scales in heterogeneous systems for Energy, Health and Transport – “NEWFRAC”**.

NEWFRAC is an Innovative Training Network (ITN) funded by the European Union’s Horizon 2020 Marie Skłodowska-Curie Actions Programme. NEWFRAC is a high-level training of a new generation of creative, entrepreneurial and innovative early-stage researchers (ESRs) through the development and engineering applications of a new modelling framework focused on the prediction and analysis of multi-field fracture phenomena in heterogeneous engineering systems at different scales. NEWFRAC in its mission of training students capable of solving the current problems of multi-field fracture phenomena in heterogeneous engineering systems, offers **13 PhD positions** for early stage researchers (ESRs) distributed in a network of 6 European countries (**France, Germany, Italy, Portugal, Spain and Switzerland**) and a country associated (**Israel**), with the participation of prestigious academic and industrial institutions that will allow researchers to grow and develop their technical skills in a multisectoral environment.

Besides working on their project at their home institutions, the researchers will participate in network-wide training events like summer schools. Moreover, they will conduct secondments at other network partners combining academic and industrial experiences.

Successful applicants will register for a PhD programme at the Faculty of Engineering - University of Porto related to the topic **Fracture of LFRP ultra-thin ply laminates in aeronautical applications**.

Ultra-thin ply composite laminates are the product of a novel manufacturing technology that produces laminates with higher longitudinal compressive and in situ strengths, higher resistance to delamination events and higher laminate tensile and compressive strengths. However, failure mechanisms in this novel material-type are not completely understood up to now, neither are the most appropriate analysis methods to represent these mechanisms. For instance, the choice of the constituent materials (reinforcing fibres and matrix) and ply size effects become

particularly important due to ply thickness, which can be as low as 0.015 mm (i.e. 2-3 fibre diameters). On the other hand, macro-mechanical homogenization is much easier to achieve in ultra-thin ply laminates due to a finer ply dispersion; hence, their mechanical behaviour is suitably represented by a homogenized quasi-brittle material model at the coupon and sub-component levels.

The aim of this project is to understand the failure mechanisms and fully exploit the load bearing capacities of ultra-thin ply laminates by means of the development of novel numerical techniques integrating Finite Fracture Mechanics (FFM) and Phase-field (PF) approaches of fracture in the most efficient way.

These modelling strategies will be set up at different scales of analysis. Micro-mechanical analysis will provide more comprehensive understanding with regard to the potential sources of damage (matrix breakage, fibre-matrix decohesion, delamination, among others), as well as the prospective propagation paths, and allow the study of constituent and ply size effects. Additionally, macro-mechanical modelling strategies will be employed to predict the macroscopic response of ultra-thin ply coupons and structures. Special attention will be devoted to investigating geometrical effects and loading states in specimens with stress concentrations and holes, which are of relevant practical importance in the aeronautical and aerospace industries. **For more information about this position please go to <https://www.newfrac.eu/>.**

Planned secondment(s):

- University of Seville (M10-15) for the formulation and numerical implementation of the FFM and PF strategies;
- FIDAMC (M24-27) for training in ultra-thin ply laminates applied in the aeronautical sector and transfer of the computational tools developed for these laminates.

Position Information:

Eligibility and admissibility conditions:

- Candidates should have a master's degree in Mechanical Engineering, Aeronautical Engineering, Civil Engineering, Physics, Applied Mathematics, or a relevant discipline earned before October 31, 2020;
- Excellent undergraduate and Master's degree grades;

- Documented background in Composite Materials, Continuum Mechanics, Finite Element Method, Fracture Mechanics;
- Ability to work in a project team and take responsibility for own research goals;
- Fluency in communicating and reporting in English;
- At the time of the recruitment the researcher must be in the first four years (full-time equivalent research experience) of their research careers and have not been awarded a doctoral degree;
- Mobility Rule: At the time of the recruitment researchers shall not have resided or carried out their main activity (work, studies, etc.) in Portugal for more than 12 months in the 3 years immediately prior to the appointment (compulsory national service, short stays such as holidays, and time spent as part of a procedure for obtaining refugee status under the Geneva Convention are not taken into account);
- 'Date of Recruitment' means the first day of the employment of the researcher (i.e. contract starting date) and 'Full-Time Equivalent Research Experience' is measured from the date when the researcher obtained the degree entitling him/her to embark on a doctoral degree programme.

Duration:

This full-time position is offered under an Uncertain Term Employment Contract never exceeding the maximum limit of four years.

Marie Curie ITNs provide competitive financial support to the ESR including: a competitive monthly living and mobility allowance and coverage of the expenses related to the participation of the ESR in research and training activities (contribution to research-related costs, meetings, conference attendance, training actions, etc.). The recruited researchers will have a regular contract with the same rights and obligations as any other staff member of the institution.

Expected starting date: November 02, 2020

Financial conditions/benefits:

- Employment Contract (Temporary), Full-time
- € 2 753,34/month
- Mobility allowance: € 600/month
- Family allowance: € 500/month (subject to family situation)

These amounts are gross amounts, subject to taxation according to Portuguese national law. Consequently, the net salary results from deducting all compulsory (employer and employee) social security contributions as well as direct taxes (e.g. income tax) and insurance from these gross amounts.

- Legislation and regulations: Labour Code, Law no 7/2009, February 12, in its current wording.

Applications:

The applications must be e-mailed to recursoshumanos@fe.up.pt mentioning the reference **FEUP-NewFrac-ESR4-THIN** in the subject, and should also be submitted at the website <https://www.newfrac.eu/phd-positions/esr4>.

Selection procedure:

- *Curriculum Vitae*, including past academic performance (grades) and background, scientific relevance and aptitude to research, and any other additional pertinent data submitted in the application (such as scientific publications, if any);
- Selection Interview, either in person at the campus, or via standard internet videoconference.

Detailed information about the selection criteria is available at https://sigarra.up.pt/feup/pt/conteudos_service.conteudos_cont?pct_id=679391&pv_cod=51av6Ui1lbya

Conditions of award of the Scholarship: After this selection procedure it is mandatory to apply to FEUP's Programme respecting the following procedure:

Programa Doutoral: Doctoral Programme in Mechanical Engineering

Condições de acesso e critérios de seriação PT: Informações para candidatura - PRODEM 2020/2021 (short link: <https://s.up.pt/xcnj>)

Access conditions and selection criteria EN: Information for applications - PRODEM 2020/2021 (short link: <https://s.up.pt/z1vr>)

List of documents fixed for the enrollment in the studies cycle - PT and EN: PRODEM_Docs candidatura/application_2020/2021 (short link: <https://s.up.pt/7kvn>)

Signing the contract implies enrolling and attending the Doctoral Programme selected at FEUP. The contract will only be signed after the confirmation of this last phase.

Documents to be submitted with the application:

- Elements of identification document;
- A detailed *Curriculum Vitae*;
- A motivation letter (please refer whether or not you have applied to any other position in NEWFRAC);
- Grade transcripts and BSc/MSc diploma;
- Two recommendation letters. The persons who write the recommendation letters should know the candidate well, know the candidate long enough to write with authority, know the candidate work and the candidate educational and career goals;
- Declaration of honour regarding the residency for the last three years. You have the template of this declaration available here:
https://sigarra.up.pt/feup/pt/conteudos_service.conteudos_cont?pct_id=679407&pv_cod=51aPeaAXpaQS

Deadline of the recruitment process: From 11/05/20 until 30/06/20 (17h00m, Europe/Brussels Time).

Communication of the results: the candidates will be notified to the email indicated in the application.

Notice for the selected candidate: If the selected candidate for the job position obtained a higher education degree abroad, and in order to sign the employment contract and enrol in the Doctoral Programme, he/she might be required to deliver the academic transfers and degree certificates authenticated by consular offices or embassies of Portugal located in the country where the qualification was obtained, or hold the Hague Apostille, for countries that acceded to the Hague Convention. The same applies to the translations (mandatory) of documents whose original language is not Portuguese, Spanish, French or English.

If the degree has been awarded by a foreign higher education institution, it must comply with the provisions of the Decree-Law no. 66/2018, of august 16th, and any formalities established there must be fulfilled until the time of signing the contract.