MARIE Skłodowska-CURIE INNOVATIVE TRAINING NETWORK

OPEN CALL – PhD position

Host (recruiting) organisation

Eindhoven University of Technology, Eindhoven, Netherlands

Project Title: High-fidelity media modelling for digital printing

Supervisory team

Primary academic institution	Industrial institution
Prof. Marc Geers Dr. Ron Peerlings Eindhoven University of Technology	Dr. Louis Saes Océ Technologies
Secondary academic institution Prof. Thierry J. Massart Université libre de Bruxelles	

Project description

Océ, a Canon company, is a global leader in digital imaging and industrial printing. New generations of its products use ink-jet technology on plain paper sheets. The inks used are often water-based. The consequent wetting and drying may result in significant deformations of the sheet. It is of paramount importance to understand, predict and control this mechanical response of the media subjected to wetting and drying.

The simulation of dimensional instabilities due to hygroscopic strain is scientifically challenging because (i) they involve local buckling phenomena, which render conventional nonlinear finite element simulations unstable; (ii) they also involve rapidly changing contact conditions, resulting in even poorer convergence; (iii) no reliable sheet-level constitutive models are available, although the underlying fibre-level mechanisms are partially understood; (iv) the problem is thus of a multi-scale nature, the smallest relevant scale being a fibre diameter and the largest the sheet size.

In this project we aim to address the above scientific challenges via two routes: (i) the development of a multiscale methodology to establish macro-scale constitutive models, by rigorously homogenising micro-structural models which incorporate the relevant fibre-level phenomena; (ii) the development of more robust sheet-level computational methods, by regularising the discontinuities ensuing from buckling and contact using advanced discretisation approaches that offer a higher degree of regularity.

With these methods in hand, the industrial partner, Océ, will be in a position to design their machines' paper handling such that the detrimental effects of hygroscopic strains are optimally mitigated.

Benefits

- Doctorate degree from both Eindhoven University of Technology and Université libre de Bruxelles
- Integration within a high-tech industrial lab
- 48 month full-time employment contract
- Additional mobility and family allowances
- 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

Eligibility

Applicants shall, at the time of recruitment by Eindhoven University of Technology, be in the first four years (full-time equivalent research experience) of their research careers and have not been awarded a 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 the Netherlands 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

Closing date: Until position is filled

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

Questions: protechtion.itn@upc.edu