University
of Ljubljana

Faculty
of Civil and Geodetic Engineering

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A position is offered at the University of Ljubljana, Faculty of Civil and Geodetic Engineering, starting from 1 April 2020 and limited for 36 months for an

Early stage researcher (THREAD ESR 14)

on the Marie Curie ITN funded project
"Geometrically and materially nonlinear beam dynamics with strain localisation"
(full-time employment).

The position is offered within the EU Marie Skłodowska-Curie Innovative Training Networks in the project "Joint Training on Numerical Modelling of Highly Flexible Structures for Industrial Applications [THREAD]". The salary of the Marie Skłodowska-Curie Innovative Training Networks Fellowship (MSCA-ITN) follows the regulations set by the European Commission. The salary will include social security and will be composed of living, mobility and family allowances, where applicable, as outlined in the Grant Agreement and Horizon 2020 Marie Skłodowska-Curie Actions Work Programme, please see here:
http://ec.europa.eu/research/participants/data/ref/h2020/wp/2018-2020/main/h2020-wp1820-msca_en.pdf

Background

THREAD addresses the mechanical modelling, mathematical formulations and numerical methods for highly flexible slender structures like yarns, cables, hoses or ropes that are essential parts of high-performance engineering systems. The complex response of such structures in real operational conditions is far beyond the capabilities of current virtual prototyping tools. With 14 new PhD positions at 12 universities and research institutions in Austria, Belgium, Croatia, France, Germany, Norway, Slovenia and Spain, the project brings mechanical engineers and mathematicians together around major challenges in industrial applications and open-source simulation software development. It establishes an innovative modelling chain starting from detailed 3D modelling and experimental work to build validated 1D nonlinear rod models, which are then brought to a system-level simulation thanks to the outstanding numerical properties of the developed algorithms. This holistic approach combines advanced concepts in experimental and theoretical structural mechanics, non-smooth dynamics, computational geometry, discretisation methods and geometric numerical integration and will enable the next generation of virtual prototyping.

The current Early Stage Researcher PhD project (ESR) on numerical modelling of geometrically and materially non-linear beams will be supervised by Prof. Dejan Zupan (University of Ljubljana, Faculty of Civil and Geodetic Engineering). The ESR will develop non-linear finite beam elements that will be able to efficiently describe strain localisation. The workplace will be in the Chair of Mechanics at the Faculty of Civil and Geodetic Engineering

that is specialised in finite element modelling and numerical formulations of non-linear problems in structural mechanics (https://www.en.fgg.uni-lj.si/departments-and-chairs/chair-of-mechanics/).

Requirements

- MSc in Engineering, Mathematics, Computational Mechanics or related fields is prefered.
- Programming skills are highly desirable, in particular experience with Matlab or Python.
- Experience in solid mechanics and numerical mathematics is desirable.
- High standard of spoken and written English is required.
- Qualification as an "Early Stage Researcher", i.e. at the time of appointment no doctoral degree and less than 4 years of research experience (full-time equivalent) after obtaining a degree that formally allows you to embark for a doctorate.
- Mobility requirement: at the time of appointment an "Early Stage Researcher" must not have resided or carried out their main activity in Slovenia for more than 12 months in the 3 years immediately prior to their appointment.
- For more details please see here: https://thread-etn.eu/apply/.

Tasks

The ESR will work on numerical modelling of flexible beam-like structures with a special focus on strain localization. In damaged materials, strain localisation often occurs, resulting in discontinuity of strains in structural models and local loss of uniqueness of the solution. Therefore, special solution methods capable of dealing with such phenomena need to be designed. A novel family of finite beam elements taking into account geometrical and material non-linearity will be proposed. Open-source software capable of efficiently solving spatial frame-like structures with strain localization will be developed.

The ESR will join THREAD's comprehensive secondment programme including a three-month internship at the industrial partner Igmat d.d. (Building Materials Institute, Ljubljana, Slovenia) supervised by Asist. Prof. Gregor Trtnik to better understand the industrial challenges and to two one month secondments, one to Dr. Joachim Linn at Fraunhofer ITWM (Kaiserslautern, Germany) to gain experience with highly flexible slender structures in system simulation, and the other to Prof. Gordan Jelenić at the University of Rijeka (Croatia) to learn more about non-linear beam formulations.

Severely disabled persons are encouraged to apply and will be given preference in the case of equal suitability. Women are strongly urged to apply. Mobility requirements as outlined above are mandatory. All requirements will be evaluated prior to appointment.

Please submit your full application dossier only in English until 15 January 2020. Applications must be submitted on the website https://thread-etn.eu/apply/. Applications must include a motivation letter tailored to the research project, the curriculum vitae (Europass format preferred), the digital copy of the highest academic degree (e.g. master) and the contact data of up to three scientific references. For queries about the research project please contact Prof. Dejan Zupan on e-mail: dejan.zupan@fgg.uni-lj.si. For queries about the European Training Network THREAD, please contact the project coordinator at coordination@thread-etn.eu.

The position is offered with reservation of possible budgetary restrictions. Application portfolios will not be returned, application costs will not be reimbursed.