

# Post-doctoral Researcher in Advanced Modelling

**Faculty/department** Mechanical, Maritime and Materials Engineering

**Level** PhD

**Maximum employment** 38

**Duration of contract** 1 year, possibility of extension to 2 years

**Salary scale** € 2476 to € 3908 gross per month

## Mechanical, Maritime and Materials Engineering

The 3mE Faculty trains committed engineering students, PhD candidates and post-doctoral researchers in groundbreaking scientific research in the fields of mechanical, maritime and materials engineering. 3mE is the epitome of a dynamic, innovative faculty, with a European scope that contributes demonstrable economic and social benefits.

The Department of Precision and Microsystems Engineering (PME) focuses on developing knowledge and methods for small, innovative high-precision devices and systems, such as precision equipment and scientific instrumentation for the high-tech industry. Increasing miniaturisation and function density, and improving precision, speed and reliability are the key topics in our work. Our approach is multidisciplinary, fundamental and inspired by industry needs.

The vacant position is in the Structural Optimisation and Mechanics (SOM) research group. This group combines engineering mechanics and structural optimisation for application in micro/nano and precision systems, such as MEMS/NEMS. Our research is scientifically challenging, and topics include the development of methods, knowledge and technologies for the analysis and optimisation of mechanical problems and 3D designs.

You will be working in a challenging environment on one of the best technical universities in Europe (ranked 6th by the Thomson Reuters ranking). You will participate in a large group that has strong collaboration with industry partners for the implementation of solutions to real problems. You will be part of a starting programming project that will push the limits on finite element technology and optimization.

## Job description

As systems become more complex and multidisciplinary, design of these systems also becomes more complicated. To assist design of such systems, physical models and computational tools are needed for their analysis and optimisation. The SOM group's research focus is on the development of such advanced (computational) design techniques, combined with the understanding and design of innovative mechanical devices in precision and microsystems engineering.

The candidate will develop, conduct and supervise research on advanced numerical modelling. The candidate will be engaged in the development of novel formulations and their computer implementation for advanced finite element analysis. These formulations will then be combined with gradient-based optimisation for the design of complex mechanical components. The tasks to be performed include:

- Learning about advanced numerical techniques (level-set methods, XFEM/GFEM).
- Developing new FE formulations based on Generalised Finite Element Methods and their computer implementation in 'hybrida', our in-house finite element library.
- Coupling the numerical tools with mathematical optimisation (gradient-based) to carry out

the design of complex systems.

- Inspiring MSc and PhD students through teaching and supervision.
- Engaging in the writing of proposals to secure funding.

### **Requirements**

Applicants should have the following qualifications:

- PhD in Engineering or a related area with a strong background in solid mechanics and numerical modelling. In particular, candidates should have extensive experience in Finite Element Analysis.
- A good publication record.
- Extensive programming experience. Most of the programming tasks will be executed in Python, but knowledge of C/C++ will be an asset. Proof of programming the FEM will be considered an asset as well.
- Knowledge of eXtended/Generalised Finite Element Methods and gradient-based optimisation (e.g., topology optimisation) will be valued. Additional valued knowledge includes: iso-geometric analysis, level-sets, NURBS, T-splines.
- Proactive, team player attitude and good communication skills.

### **Conditions of employment**

TU Delft offers an attractive benefits package, including a flexible work week and the option of assembling a customised compensation and benefits package (the 'IKA'). Salary and benefits are in accordance with the Collective Labour Agreement for Dutch Universities.

### **Information and application**

For more information about this position please see <http://www.3me.tudelft.nl/en/about-the-faculty/departments/precision-and-microsystems-engineering/vacancies/> or contact Dr. A.M. Aragón, phone: +31 (0)15-2782267, e-mail: [a.m.aragon@tudelft.nl](mailto:a.m.aragon@tudelft.nl). To apply, please e-mail three recommendation letters, a complete CV with comprehensive publication list, programming projects involved in, etc., along with a letter of application by 12 December 2015 to Mrs. Bianca van Someren, [application-3ME@tudelft.nl](mailto:application-3ME@tudelft.nl). Applications after this date will be considered if the post is still vacant.

When applying for this position, please refer to vacancy number 3ME15-38.