

## Job posting

At the faculty of Civil Engineering - Bauhaus-Universität Weimar a position of a

### Doctoral Student / PhD candidate

at the DFG – Research Training Group 1462 “**Evaluation of Coupled Numerical and Experimental Partial Models in Structural Engineering**” is available as of June 2014, max. 3 years.

A reliable assessment of safety and usability of both newly constructed and existing buildings requires theoretical/numerical and thereon adapted experimental models. The overall goal is to elaborate prognosis models of the behaviour of construction details and entire complex structures that can serve to reliably predict the behaviour of the structures such that it fits the expected assertions, e.g. durability or dynamic behaviour. This includes the validation and parameter estimation of theoretical/numerical models.

The proposed research program involves a consistent methodology for the quantitative evaluation of experimental and theoretical/numerical models and also of their interaction in structural engineering and represents a significant step towards the creation of new design principles whose fundamental applicability on selected prototypical reference objects is demonstrated. Based on the previous investigations in the Phase I of the GRK that were only dedicated to theoretical/numerical simulation models, a strong emphasis shall be put on the methods to evaluate the robustness, sensitivity, complexity and uncertainty of the experimental partial models and their connection with the numerical simulation.

A central component of the training program is the assistance of the critical results of the individual work through discussion sessions with other candidates. Moreover the qualified work is supported through highly developed communication skills in international interdisciplinary teams.

The main objective of the Research Training Group is the development and allocation of an integrated, modern and interdisciplinary scientific program. The topics are primarily addressed to engineers and natural scientists. The purpose is to connect different disciplines involved and thus the development of an interdisciplinary program with an international reputation.

#### Requirements:

- successfully finalized master study (M.Sc.), civil and structural engineering are not prerequisite;
- knowledge in numerical methods, especially finite element methods;
- skills in object-oriented modeling and Java programming as well as *basic knowledge* of commands and syntax to write scripts in *MATLAB*;
- joy in common scientific working in an interdisciplinary group;
- interest in the developed and applied methods at the GRK1462 to the model quality assessment;
- ability to work in a team,
- good knowledge of English for the communication in an international team and publication of the achieved results in international journals.

#### Topic to be edited:

**Sensor-based, hybrid partial models for the decentralized status assessment of engineering structures** (Supervisor: Prof. Dr.-Ing. K. Smarsly)

Goal of this research is the investigation of hybrid partial models in civil engineering. Here, the term "hybrid" describes partial models that are located in different domains and on different scales, i.e. both in software systems and in hardware components, such as measuring devices or wireless sensor nodes. A major objective is to embed mathematical partial models into wireless sensor nodes in order to enable an automated assessment of the structural conditions of civil infrastructure, i.e. the structural

assessment will technically be done directly at the sensor level through intelligently cooperating, autonomous sensor nodes. In addition to the integration of mathematical partial models, it is envisaged to integrate numerical models into the sensor nodes, which still is an open problem in the field of microcontroller and sensor technologies due to the multi-scale and multi-dimensional nature of the problem. As a result of this research, it is expected to gain new insights into sensor-based embedded computing strategies applied for structural health monitoring of civil infrastructure. Also, the quality of the partial models will be assessed. For this research project, existing measurement data can be used collected from different reference structures within previous and existing projects of the Research Training Group.

Members of the Research Training Group 1462 are committed:

- to attend the offered scientific program;
- to complete a stay abroad (2 – 6 months);
- to prepare at least two publications in international journals;
- to contribute to the research on the reference objects in collaboration with the colleagues;
- to write the thesis in English.

Additionally, it will be expected that the PhD candidate will contribute to the lectures at the faculty of civil and structural engineering at the Bauhaus-Universität Weimar in the frame of her/his working field and in collaboration with her/his supervisors.

After completion of the DFG financing the submission of the PhD-candidate theses will be expected.

The salary is regulated according to the terms and conditions of the collective labour agreement of the public service of the states ("öffentlichen Dienst der Länder" – TV-L) corresponding to the personal requirements up to tariff part 13 TV-L.

The Bauhaus-Universität Weimar aspires to increase the percentage of women in research and teaching and particularly request women to apply for the position. Handicapped people are emphatically requested to apply and with equal qualifications will be preferentially considered.

In case of any questions, don't hesitate to contact the CEO Dr.-Ing. Lars Abrahamczyk (ceo.grk1462@uni-weimar.de).

Please send your application in digital form (.pdf) with the customary significant documents and with indication of the identification code **B/GRK-05/14** until **May 1, 2014** to:

Dr.-Ing. Lars Abrahamczyk  
ceo.grk1462@uni-weimar.de

For further information, please see: [www.uni-weimar.de/grk](http://www.uni-weimar.de/grk)