



INVESTMENT IN EDUCATIONAL DEVELOPMENT

Education for Competitiveness OP • Area 2.3.: Human resources in research and development • Call 30 • Round 1 • CZ.11.07/2.3.00/30.0005

SUPPORT FOR THE CREATION OF EXCELLENT INTERDISCIPLINARY RESEARCH TEAMS AT BRNO UNIVERSITY OF TECHNOLOGY

FCE BUT BRNO

2012-03-29

RECRUITMENT ANNOUNCEMENT

The Dean of the Faculty of Civil Engineering at Brno University of Technology (FCE BUT) has initiated recruitment for a total of eight academic staff for the position of

Post-doctoral Researcher (Specialist Team Member).

The vacancies are available within the Education for Competitiveness Operational Program »Support for the creation of excellent interdisciplinary research teams at Brno University of Technology«, which is co-financed by the European Social Fund and the Czech state budget. In total BUT has created 42 postdoctoral positions within this project. The posts are at the following seven research centres:

1. Advanced Materials, Structures and Technologies (AdMaS),
2. Centre of Research and Use of Renewable Energy Resources (CVVOZE),
3. Centre of Sensory, Information and Communication Systems (SIX),
4. Centre of Materials Research (CMR FCH),
5. IT4INNOVATIONS Centre of Excellence (IT4I),
6. New Technologies for Mechanical Engineering (NETME),
7. Central European Institute of Technology (CEITEC).

The post-docs offered posts at FCE BUT will be integrated into scientific research teams at the **AdMaS Centre** (Advanced Materials, Structures and Technologies), which is part of the faculty. One position in each team may be occupied by only one post-doc **full-time for 35 months**.

SCIENTIFIC RESEARCH TEAMS AND RESEARCH AREAS:

- **Team A** - mentor: **Prof. Ing. Drahomír Novák, DrSc.**, Institute of Structural Mechanics
Research Interest: Reliability and stochastic nonlinear fracture mechanics
Specific Requirements: Reliability of civil engineering structures, stochastic computational mechanics, risk engineering, stochastic fracture mechanics of continua, Monte Carlo simulation methods, modelling of concrete structures, the stochastic finite element method, failure of quasi-brittle materials, size effect, and probabilistic optimization of structures.
- **Team B** - mentor: **Doc. Ing. Zbyněk Keršner, CSc.**, Institute of Structural Mechanics
Research Interest: Numerical and experimental analysis of fracture processes in quasi-brittle materials
Specific Requirements: Analysis of fracture processes in quasi-brittle materials: Fracture mechanics of silicate composites and other types of composites, fracture-mechanical parameters of HSC, HPS and FC, toughening mechanisms of cement-based composites, fracture initiation, fatigue behaviour of cement-based composites, creep and shrinkage of concrete, modelling of concrete as a two-phase material, fractal aspects of fracture, and reliability analyses of civil engineering structures/members.

- **Team C - mentor:** **Doc. Ing. Miroslav Vořechovský, CSc.**, Institute of Structural Mechanics
Research Interest: Statistical aspects and reliability of advanced composite materials
Specific Requirements: Nonlinear fracture mechanics with a focus on stochastic aspects. Size effects and scaling in structures. Behaviour of fibers, yarns and fiber-reinforced composites. Advanced methods of reliability engineering, mathematical statistics (random variables, random fields and processes, extreme value theories) connected with nonlinear fracture mechanics methods (study of the behaviour of quasi-brittle materials/structures). Stochastic optimization techniques, structural safety and reliability, stochastic computational methods, Monte Carlo simulation techniques, genetic algorithms. Programming and software development.

- **Team D - mentor:** **Ing. David Lehký, Ph.D.**, Institute of Structural Mechanics
Research Interest: Failure modelling, optimization, reliability and life-time assessment of structures
Specific Requirements: Failure modelling of concrete structures using nonlinear fracture mechanics. Analysis of crack formation and propagation in quasi-brittle materials. Fully probabilistic statistical and reliability analysis of structures. Utilization of advanced simulation techniques. Optimization and inverse analysis on the material and structural levels using soft-computing methods. Identification of the fracture-mechanical parameters of quasi-brittle materials. Damage detection in dynamically loaded structures. Inverse reliability analysis for the determination of design parameters within fully probabilistic structural design.

- **Team E - mentor:** **Prof. RNDr. Ing. Petr Štěpánek, CSc., MBA**, Institute of Concrete and Masonry Structures
Research Interest: Composite structures (design, analysis, experiments, optimization)
Specific Requirements: Design and development of composite (non-metallic) systems for the reinforcement and strengthening of structures. Modification of existing systems and materials to meet requirements regarding their utility properties and material characteristics. Experimental verification of material properties. Experimental verification of the behaviour of structures reinforced with composite reinforcement - large scale testing and testing of small component parts. Testing of structures exposed to extreme loading (aggressive environments, fire effects, dynamic loading and fatigue). Analysis of test results and subsequent application of the results to create theoretical, analytical and numerical models. Production of design methods and verification procedures for structures reinforced with composite reinforcement covering bearing capacity, the reliability of the structure and the influence of extreme loading. Design routines taking into consideration the optimization of the whole structure according to current requirements (economical, reliability and ecological aspects).

- **Team F - mentor:** **Doc. Ing. Vladislav HORÁK, CSc.**, Institute of Geotechnics
Research Interest: Rock mechanics
Specific Requirements: Interdisciplinary research into natural building materials. At the macro scale, the study will be oriented towards their structural, petrographic, physicochemical and thermal properties. At the micro scale, the research will be focused on their detailed mineralogical characteristics, as well as detailed geochemical characteristics accompanied by modern geochemical modelling based on major oxides, trace elements and Sr, Nd and Pb isotopes. The greatest emphasis will be placed on interdisciplinary research on natural building materials with unusual mineral compositions (e.g., alkaline amphibole and/or Ba, Ti, Zr-rich minerals) and geochemical compositions (per alkaline), where it can be expected that specific geotechnical properties will be useful in the construction industry. In the case of non-traditional building materials, interdisciplinary research will be also focused on issues connected with their petrogenesis.

- **Team G** - mentor: **Doc. Ing. Jiří Bydžovský, CSc.**
Institute of Technology of Building Materials and Components

Research Interest: Repair and rehabilitation of concrete structures

Specific Requirements: Research into and development of polymer protection for concrete structures exposed to corrosive environments. The proposed area of interest is focused on protective polymer and silicate repair materials, repair systems, material interaction, and the influence of chemical composition on the durability of repairs, highly chemically resistant impregnations, coatings and other surface materials. The use of such protections is proposed in different industries, for example the chemical and food industries. The influence of alcohols on epoxy coatings and the interaction of substrate with repair systems and interaction within system layers will form part of the focus of interest.

- **Team H** - mentor: **Ing. Vít Petránek, Ph.D.**
Institute of Technology of Building Materials and Components

Research Interest: Building materials, surface protection

Specific Requirements: Research into and development of surface coatings for the improvement of construction performance. The area of interest includes issues connected with the use of surface active materials for building and other industrial uses, e.g. surface layers with TiO₂, the self-cleaning capabilities of surface layers containing nanoparticles enabling photo catalysis, resistance to bio corrosion, surface active materials for the solidification of wastes, cellular concrete as a catalyser of chemical processes, catalytic oxidation of volatile organic compounds, and the solidification of wastes using synthetic tobermorite as an ion exchanger.

JOB DESCRIPTION

The recruited post-docs will strengthen existing scientific research teams at the Faculty of Civil Engineering, Brno University of Technology. Their main task will be to engage in research activities under the guidance of specialist mentors.

They will discharge a set plan of research activities and educational activities (lectures and / or training) in the range of 3-5 hours per calendar week. Their postdoctoral scientific work will also include involvement in national and international research projects (GA ČR, TA ČR, MPO, etc.), the publishing of scientific research results in international journals with a high-impact factor, the generation of results with industrial application, etc.

The job description will also include internships of 3 to 6 months in length, participation in international and national conferences and the transfer of gained information and findings to other staff and students through workshops.

REQUIRED QUALIFICATIONS

- A successfully completed doctoral study program (PhD degree) at a University in the Czech Republic, or a successfully completed similar study program at a University in another country, approved by Czech regulation 111/1998 Coll. on higher education, including amendments to other Acts (the Higher Education Act), as amended. Date of graduation after 28. March 2008, incl.,
- good knowledge of the Czech or English language (min. CAE or the equivalent),
- experience with research in the area of specialised focus of the research team,
- the ability to use one's initiative and to take a creative approach to work tasks.

EXPECTED COMMENCEMENT OF EMPLOYMENT

01. 07. 2012 or 01. 08. 2012

SALARY

Starting salary 40,000 CZK/month (approx. 1,600 €/month), in the third year of the project up to 60,000 CZK/month (approx. 2,400 €/month).

PUBLICATION OF THE RECRUITMENT ANNOUNCEMENT

On Thursday 2012-03-29 the recruitment announcement will be made public via an advertisement in the national daily newspaper MF DNES, and also via display on a public notice board at BUT and another public notice board at FCE BUT. It will also be published on the websites of BUT, FCE BUT and via other media.

DEADLINE FOR THE SUBMISSION OF APPLICATIONS

Within thirty days of the recruitment announcement.

INTERVIEW DATES

24. 05. 2012 and/or 25. 05. 2012

REQUIRED APPLICATION DOCUMENTATION

Candidates for the offered postdoctoral research positions should submit an application, written in Czech or English, which includes their contact information and specifies their chosen scientific research team.

The submitted application should include the following mandatory documentation:

1. a Curriculum Vitae (including a brief description of the candidate's research and educational achievements),
2. a copy of a document giving proof of education achieved – a Ph.D. diploma or equivalent,
3. a copy of a certificate showing the applicant's achieved level of English language ability (CAE or equivalent),
4. overview of research teams with whom the candidate has worked until now, including projects in which he/she was involved,
5. an overview of the candidate's published articles in journals with high impact factor, and in other publications,
6. a list of citations of the applicant's work in international scientific literature,
7. an overview of the implementation in practice of the candidate's research outputs.

The application, and each of the above attachments, must be signed by the applicant.

SUBMIT THE WRITTEN APPLICATION TO:

Ms M. Štěpánková
Human Resources Department
Faculty of Civil Engineering BUT
Veveří 331/95
602 00 BRNO

Paní M. Štěpánková
Zaměstnanecké oddělení
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NOTE

The recruitment announcement is displayed on notice boards at BUT and at the FCE, and in the university and faculty information systems. It is also published in selected national newspapers, specialised journals and on the websites of operational programs, professional organizations, etc.

Prof. Ing. Rostislav Drochytka, CSc.
Dean of the FCE BUT