TUD Dresden University of Technology, as a University of Excellence, is one of the leading and most dynamic research institutions in the country. TUD together with RWTH Aachen have established the Collaborative Research Center/Transregio 280 - Design strategies for material-minimized carbon-reinforced concrete structures, funded by the German Research Foundation (DFG). This interdisciplinary group, involving ten faculties at three universities and the Leibniz-Institut für Polymerforschung Dresden e. V., will conduct research on 21 research topics with 25 PhD candidates in the second funding period (07/2024 to 06/2028).

The goal is the reduction of resource consumption and environmental impacts such as CO₂ emissions through novel design and construction principles and even more efficient materials, based on Carbon-reinforced concrete (CRC). CRC is a novel, rapidly evolving material poised to revolutionize innovative civil engineering applications. It consists of two high-performance constituents: high-strength carbon reinforcement and eco-friendly concrete.

TUD and the TRR embodies a university culture that is characterized by cosmopolitanism, mutual appreciation, thriving innovation and active participation. For TUD diversity is an essential feature and a quality criterion of an excellent university. Accordingly, we welcome all applicants who would like to commit themselves, their achievements and productivity to the success of the whole institution.

At the Faculty of Civil Engineering, Institute for Structural Analysis the Chair of Structural Analysis offers, subject to the availability of resources, a position within the DFG-funded SFB/TRR 280 as

**Research Associate / PhD Student (m/f/x)**
(subject to personal qualifications, employees are remunerated according to salary group E 13 TV-L)

starting **as soon as possible**. The position is limited until June 30, 2028. The period of employment is governed by the Fixed Term Research Contracts Act (Wissenschaftszeitvertragsgesetz - WissZeitVG). The position aims at obtaining further academic qualification (usually PhD).

**Job ID:** SFB/TRR280-A02

**Title:** Biology inspired modeling of manufacturing processes

**Investigators:** Prof. Michael Kaliske, Director of the Institute for Structural Analysis
Dr.-Ing. Johannes Storm, Group leader at the Institute for Structural Analysis

**Requirements:** very good degree as Master of Science (M.Sc.) or Diplom-Ingenieur (Dipl.-Ing.) in civil engineering or mechanical engineering (or comparable) with deep knowledge in computational mechanics, modelling and simulation

**Description of the PhD topic:** The goal of the PhD project is the modeling of the manufacturing process of carbon-reinforced concrete structures. The realistic simulation of concrete hydration, the interaction with the reinforcement structure and the prediction of the mechanical properties of the final component form the basis for a preselection of promising candidates before manufacturing and testing. As a consequence, insight is gained regarding the advantages and disadvantages of certain production techniques and produced geometries. The mechanical modeling to be developed will be based on a multi-physical, multi-scale and phase-transition formulation for a high-performance computation environment.

**Tasks:** Independent and cooperative qualification through scientific research within the doctoral study project on offer; training in the technical tasks of the individual dissertation topics through study
of the literature and in making the objectives more precise; working on the individual doctoral study project with strong numerical focus in collaboration with other SFB/TRR 280 members (fellow students and supervising professors); implementation of the planned research program, evaluation and interpretation of the results and transferring them to a TRR internal exchange platform, elaboration and presentation of the state-of-the-art in the respective research fields; participation in lectures, workshops and summer schools according to the guidelines of the TRR curriculum; supporting scientific graduation work (Bachelor/Master/Diploma) in the subject-specific research field; regular reporting on research progress to the supervising professors; publishing the results of the research work individually and in concert with others; cooperative maintenance of exchange platforms (database, information pages, etc.); summarizing the results of the individual doctoral study project in a dissertation within the due time of 4 years. Successful candidates will work together with approx. 30 PhD candidates at the Chair of Structural Analysis and together with other chairs being part of the TRR.

**General Requirements:** We are looking for first-class graduates with expertise in computational mechanics, high interdisciplinary desire to learn and willingness to cooperate, very good verbal and written English communication skills as well as the absolute determination to submit the dissertation after 4 years of research.

**What we offer:**

- **Pioneering Research Environment:** Shape the future of carbon-reinforced concrete components and constructions in our interdisciplinary research project. Develop innovative manufacturing technologies through the virtual manufacturing framework in an ongoing knowledge exchange from and to the project partners. Make use of the most powerful high-performance computer clusters in Dresden and Germany for the solution of the challenging simulation tasks.
- **Cross-Disciplinary Collaboration:** Immerse yourself in a highly collaborative and interdisciplinary research environment, where you will work alongside experts from fields such as engineering, sustainability, material science, biology, data science, architecture, mathematics and geodesy.
- **Skill Development:** Our extensive qualification concept goes beyond research, offering targeted training in material and manufacturing technology, data analytics, regulatory aspects, project management, and leadership skills. This ensures you graduate not only as a specialist in your field but also as a well-rounded professional.
- **Global Networking:** Collaborate with our network of local and international partners, fostering connections that transcend geographical boundaries and enrich your academic and professional network. This includes participation in conferences and research stays abroad.
- **Career Advancement:** Receive dedicated support for fellowship applications and tailored guidance for your career.
- **Quality of Life in Dresden:** Experience a high quality of life in Dresden with its dynamic urban scene, relatively affordable living, rich cultural offerings, and vibrant nightlife.

Further questions regarding the open PhD position can be discussed with the supervisor, Prof. Dr.-Ing. habil. Michael Kaliske (michael.kaliske@tu-dresden.de).

TUD strives to employ more women in academia and research. We therefore expressly encourage women to apply. The university is a certified family-friendly university and offers a Dual Career Service. We welcome applications from candidates with disabilities. If multiple candidates prove to be equally qualified, those with disabilities or with equivalent status pursuant to the German Social Code IX (SGB IX) will receive priority for employment.
Please submit your detailed application including a cover letter detailing your research along with your curriculum vitae, academic transcripts with marks, a letter of recommendation and your publications (if applicable) by July 23, 2024 (stamped arrival date of the university central mail service or the time stamp on the email server of TUD applies), preferably via the TUD SecureMail Portal https://securemail.tu-dresden.de by sending it as a single PDF file to michael.kaliske@tu-dresden.de or to: TU Dresden, Fakultät Bauingenieurwesen, Institut für Statik und Dynamik der Tragwerke, Professur für Statik und Dynamik der Tragwerke, Herrn Prof. Dr. Michael Kaliske, Helmholtzstr. 10, 01069 Dresden, Germany. Please submit copies only, as your application will not be returned to you. Expenses incurred in attending interviews cannot be reimbursed.

Reference to data protection: Your data protection rights, the purpose for which your data will be processed, as well as further information about data protection is available to you on the website: https://tu-dresden.de/karriere/datenschutzhinweis.