9th European Congress on Computational Methods in Applied Sciences and Engineering (ECCOMA2024)
June 3-7, 2024, Lisbon, Portugal

BRIDGING DISCIPLINES AND SCALES FOR SUSTAINABLE CEMENT AND CONCRETE

TRACK NUMBER 1600 - MULTISCALE AND MULTIPHYSICS SYSTEMS

THOMAS MATSCHEI[*], BERNHARD L.A. PICHLER[#], MIROLAV VOŘECHOVSKÝ[†] AND ROSTISLAV CHUDOBA[*]

[*] RWTH Aachen University
Schinkelstraße 3, 52062 Aachen, Germany
matschei@ibac.rwth-aachen.de, https://www.rwth-aachen.de
Mies-van-der-Rohe-Straße 1, 52074 Aachen, Germany
rostislav.chudoba@rwth-aachen.de, https://www.rwth-aachen.de

[#] TU Wien (Vienna University of Technology)
Karlsplatz 13/202, 1040 Vienna, Austria
Bernhard.Pichler@tuwien.ac.at, https://www.tuwien.at/

[†] Brno University of Technology
Veveří 331/95, 602 00, Brno, Czechia
vorechovsky.m@vut.cz, https://www.vut.cz

Key words: cementitious materials, reinforced concrete structures, physical chemistry, multiscale mechanics, probabilistic mechanics, engineering science

ABSTRACT

The rising global demand for engineering infrastructure and the urgency to minimize the carbon footprint pose great scientific challenges regarding the development of sustainable concretes. As far as computational methods are concerned, models are needed to link the chemical/microstructural composition of cementitious materials to the behavior of engineering structures made from plain and reinforced concrete. Such models help to understand and quantify how physico-chemical processes occurring at nanoscopic and microscopic scales interplay with the macrostructural behavior of engineering infrastructure. Interdisciplinary approaches are expected to be particularly well suited to bridge all relevant spatial and temporal scales. The objective of this minisymposium is to discuss recent advances in computational modeling of concrete and concrete infrastructure. Computational models addressing various length and time scales and physical phenomena relevant for the behavior of concrete and concrete infrastructure subjected to different environmental and loading conditions are welcome. Innovative approaches providing insight into complex phenomena, predictive models increasing safety, durability, and sustainability in practical applications, and models leading to new design concepts in the field of structural engineering science are especially encouraged. Contributions linking different fields of research, e.g., physical chemistry, material science, multiscale and probabilistic mechanics, as well as structural engineering science are also particularly welcome.