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Editorial: Ultra-high performance concrete: computation and simulation methods

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Editorial on the Research Topic
Ultra-high performance concrete: computation and simulation methods

The Journal of *Ultra-High Performance Concrete: Computational and Simulation Methods* is an interdisciplinary publication dedicated to the dissemination of high-quality research on the computational and simulation methods for the design, analysis, and optimization of ultra-high performance concrete (UHPC). The journal provides a platform for researchers, engineers, and scientists from academia, industry, and government to share their latest findings, insights, and innovations in UHPC technology. The scope of the journal includes, but is not limited to, Research Topic such as material characterization and modeling, constitutive modeling, numerical simulation of concrete behavior, optimization of mix design and processing techniques, multi-scale modeling, and experimental validation of computational results. The journal welcomes original research articles, review articles, and technical notes, as well as Research topic and conference proceedings that cover the latest developments in the field of UHPC. The special periodical provided an essential resource for researchers and practitioners working in the field of concrete. The journal is committed to ensuring the highest standards of scientific rigor and editorial quality, and operates a rigorous peer-review process to ensure the accuracy, relevance, and originality of all published articles.

Up to now, this journal has included four high-quality articles, of which three involve molecular dynamics simulation and thermodynamic simulation, and the remaining one studies the actual hydration process. Specific introduction is as follows: Hu et al. studied the corrosion behavior nitrate on steel-bar, where they found that NO_2- in $LiNO_2$ had the fastest transport speed in the channels and provided the most potent driving force. These findings reasonably explain the fastest transport speed of NO_2- through the pores in $LiNO_2$ solution. The transport behavior of corrosion inhibitors in the micro-porous channels is decoded at the atomic level, which is instrumental in solving the problem of the optimal corrosion inhibitor selecting for the design of highly durable concrete. The transport speed of nitrate in the cement micro-porous channels determines the anti-corrosion effect of reinforcing steel. The aim of Zhu et al. study was to examine how the hydration process of hardened Portland cement paste is affected by different environmental pH values, by analyzing data obtained

from various experimental methods. In addition, a novel equivalent circuit model was developed in order to identify the links between electrochemical parameters and compressive strength for cement paste. The outcomes reveal that matrix strength, pore structure and hydration products are all notably impacted by changes in pH value. Utilizing an *in-situ* non-destructive EIS monitoring technique, the recommended equivalent circuit model can be used to assess the matrix strength of cement-based materials by measuring the resistivity of discontinuous connected pores (Rcp). Zhang and Lv research reveals the advancement of low-heat cementitious composite (LHCC) in dam concrete and systematically evaluates its hydration kinetics and durability performance. The results indicate that LHCC improves durability primarily due to the secondary hydration of fly ash (FA) and the optimization of internal pore structure of the concrete, compared to ordinary concrete. Sun et al. study explores the use of microbe cement to enhance municipal solid waste incineration (MSWI) fly ash. Molecular dynamics simulations are used to investigate the adsorption mechanism of heavy metal ions (Pb) in cementitious materials. The simulation results indicate that the stable formation of chemical adsorption with C-S-H is the main reason for the reduction of heavy metal leaching with cement hydration. The study also examines the strengthening effects of microbe cement experimentally using a compression test, X-ray diffraction, scanning electron microscopy, and atomic absorption spectrometer. The results show that microbe cement can significantly improve the compressive strength of MSWI fly ash, reduce heavy metal leaching, and modify the microstructure of the cementitious material.

The journal "*Ultra-High Performance Concrete: Computational and Simulation Methods*" plays a significant role in advancing the field of concrete by disseminating high-quality research on the computational and simulation methods for the design, analysis, and optimization of cement based materials. By publishing researches the journal contributes to the development of more durable, sustainable, and cost-effective construction materials, which can help address the challenges faced by the construction industry. The computational and simulation methods explored in this journal can also aid in the design and optimization of structures, which can improve safety and reduce maintenance costs. Therefore, the journal's contributions to the field of building industry have significant implications for society, including improving infrastructure, reducing environmental impact, and increasing the lifespan and safety of structures.

However, the special periodical suffered from some limitations that should be noted. Firstly, those journals focuses specifically on the use of computational and simulation methods for the design, analysis, and optimization of concrete, and therefore may not be suitable for research working on UHPC technology. Additionally, while the journal welcomes original research articles, review articles, and technical notes, it may not provide a comprehensive coverage of all the latest developments in simulations and experiments technology, as some studies may be published in other journals or conference proceedings. Finally, the journal operates a rigorous peer-review process, which may result in a longer time-to-publication for accepted manuscripts.

Author contributions

XW: writing—original draft. YM: writing, DH: review and editing, HM: review and editing, YZ: review and editing. All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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