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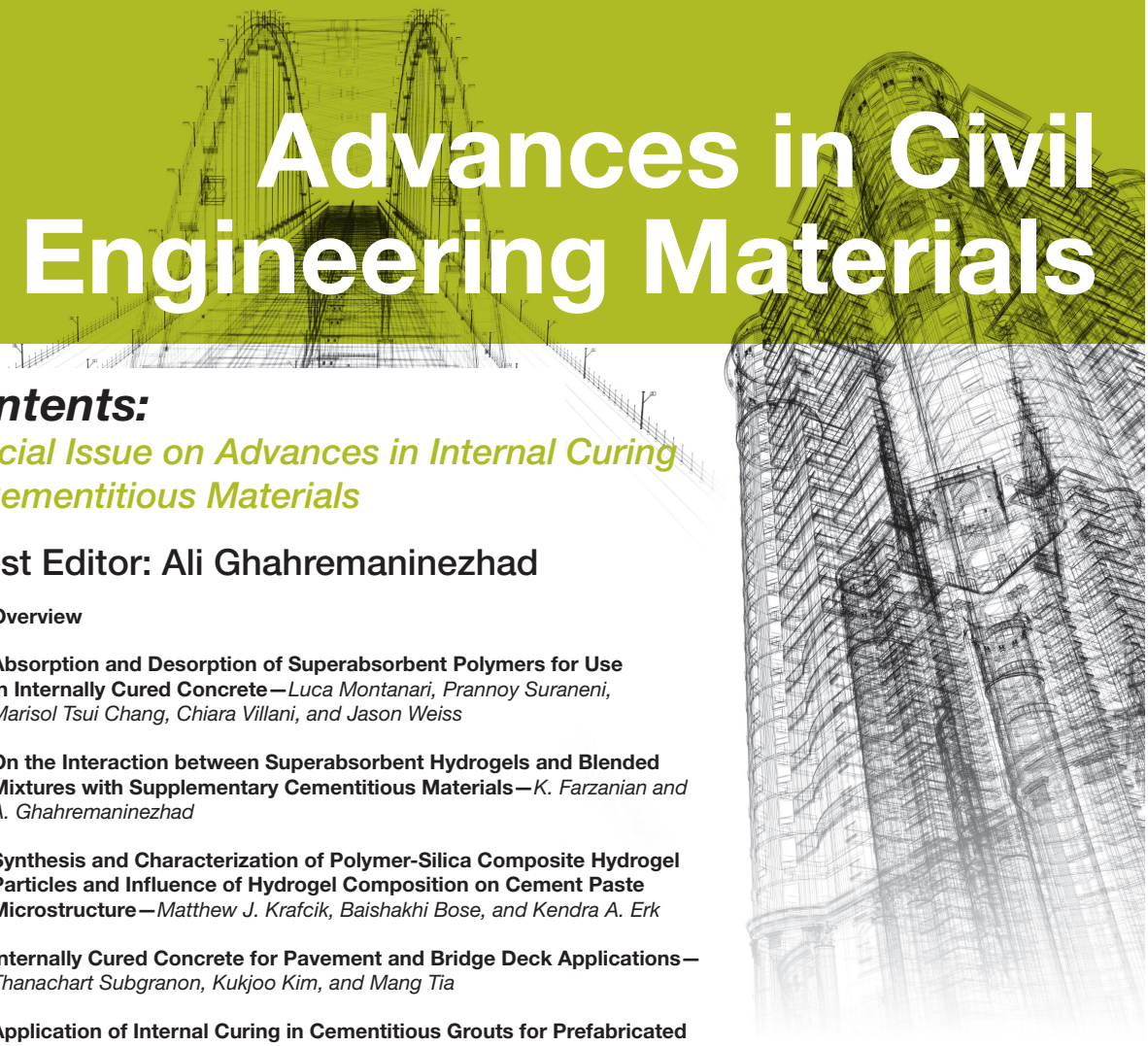

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Special Issue on Advances in Internal Curing of Cementitious Materials

Guest Editor: Ali Ghahremaninezhad

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Editorial Objectives

Advances in Civil Engineering Materials (ACEM) is published online by ASTM International, a nonprofit technical organization that develops and publishes voluntary consensus standards and related information for materials, products, systems, and services.

Contributions are peer reviewed prior to publication.

Purpose and Scope

The journal publishes high-quality, original papers on topics relating to the properties and performance of civil engineering materials. These are materials such as concrete, asphalt, steel, polymers and polymeric composites, and wood for use in civil and environmental engineering applications, such as pavements, bridges, buildings (including nonstructural elements such as insulation, and roofing), and environmental systems (including water treatment). The journal core topics are characterization, physical properties, constructability, and durability of these materials. Characterization may include chemical composition, nanostructure, and microstructure. Physical properties include strength, stiffness, and fracture behavior. Constructability includes such topics as construction methods, quality control and quality assurance, life cycle analysis, and sustainability. Durability may be determined using either fi eld performance or accelerated laboratory testing. Papers relating to sustainability of engineering materials or to the impact of materials on sustainability of engineering structures are especially encouraged.

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Overview

Special Issue on Advances in Internal Curing of Cementitious Materials

Internal curing is a relatively new technique developed to improve the curing process by providing internal reservoirs of water in cementitious materials. Internal curing was born from the need to reduce the propensity of cementitious materials to autogenous shrinkage cracking. This curing method improves hydration, thereby enhancing the performance of cementitious materials.

In the external curing method, a supply of extra water is provided from the surface of materials, which limits penetration distance of water due to dense pore structure. This issue is circumvented in internal curing where water is released from water reservoirs within the material and uniformly distributed in the matrix. Several materials—including saturated lightweight aggregates, superabsorbent polymers, cellulose fibers, among others—have been introduced to serve as internal water reservoirs in cementitious materials. These materials are able to absorb and retain a large amount of water and release it gradually into the matrix with a reduction in relative humidity.

High performance cementitious materials were introduced to improve durability and strength as compared to conventional cementitious materials. They are produced with a low water-to-binder ratio and make achieving the desired high performance possible if the material is properly cured. In low water-to-binder ratio mixtures, a phenomenon called self-desiccation takes place as water is consumed during hydration and capillary pores begin to be emptied. Self-desiccation results in the development of Laplace stresses in pores, which tend to pull inward on the solid skeleton of the matrix and cause an overall reduction in volume called autogenous shrinkage. When these stresses become large enough, cracks develop in the matrix, compromising durability and life-cycle of materials. Internal curing has proven effective in mitigating autogenous shrinkage cracking. The negative capillary pressure in the matrix provides a driving force for the release of water from internal reservoirs maintaining a high relative humidity in the matrix pore system.

Internal curing has potential to reduce transport characteristics as a result of enhanced hydration. This curing technique can also benefit mixtures with high content of supplementary cementitious materials where hydration rate is lower and takes a longer period of time.

This *Special Issue on Advances in Internal Curing of Cementitious Materials* contains 8 papers on various aspects of internal curing.

This special issue is the result of significant efforts from authors, reviewers, editors, and the publication team, which is hereby gratefully acknowledged. The guest editor acknowledges the support from ASTM International, especially Dr. Jason Weiss, Dr. Jason Ideker, Alyssa Conaway, and Sara Welliver, for their guidance and support in producing this special issue.

Guest Editor
Dr. Ali Ghahremaninezhad
University of Miami
Coral Gables, FL

Information for Authors

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The subject matter must not be of a speculative nature and the contents must not include materials of an advertising nature. The paper must not be seriously defective as to literary form and structure, continuity of thought, and clarity of expression. The substance of the paper should not have been published previously in the open literature.

Authors preparing papers for submittal should observe the conventions of style explained in the ASTM Style Manual. Since the journal does not request page charges, the author is expected to conform to these standard conventions for style. SI units are to be used throughout; if data were not measured in SI units, a note should appear to that effect and the original units should be included in parentheses after the SI units.

IN APPRECIATION

The high quality of the papers that appear in this publication is a tribute not only to the obvious efforts of the authors represented but to the unheralded, though essential, efforts of their reviewers. It is to the reviewers dedication to upholding the high standards of their profession that this note pays tribute. On behalf of ASTM International and the authors as well, we acknowledge with appreciation their important contribution to the success of this journal.

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