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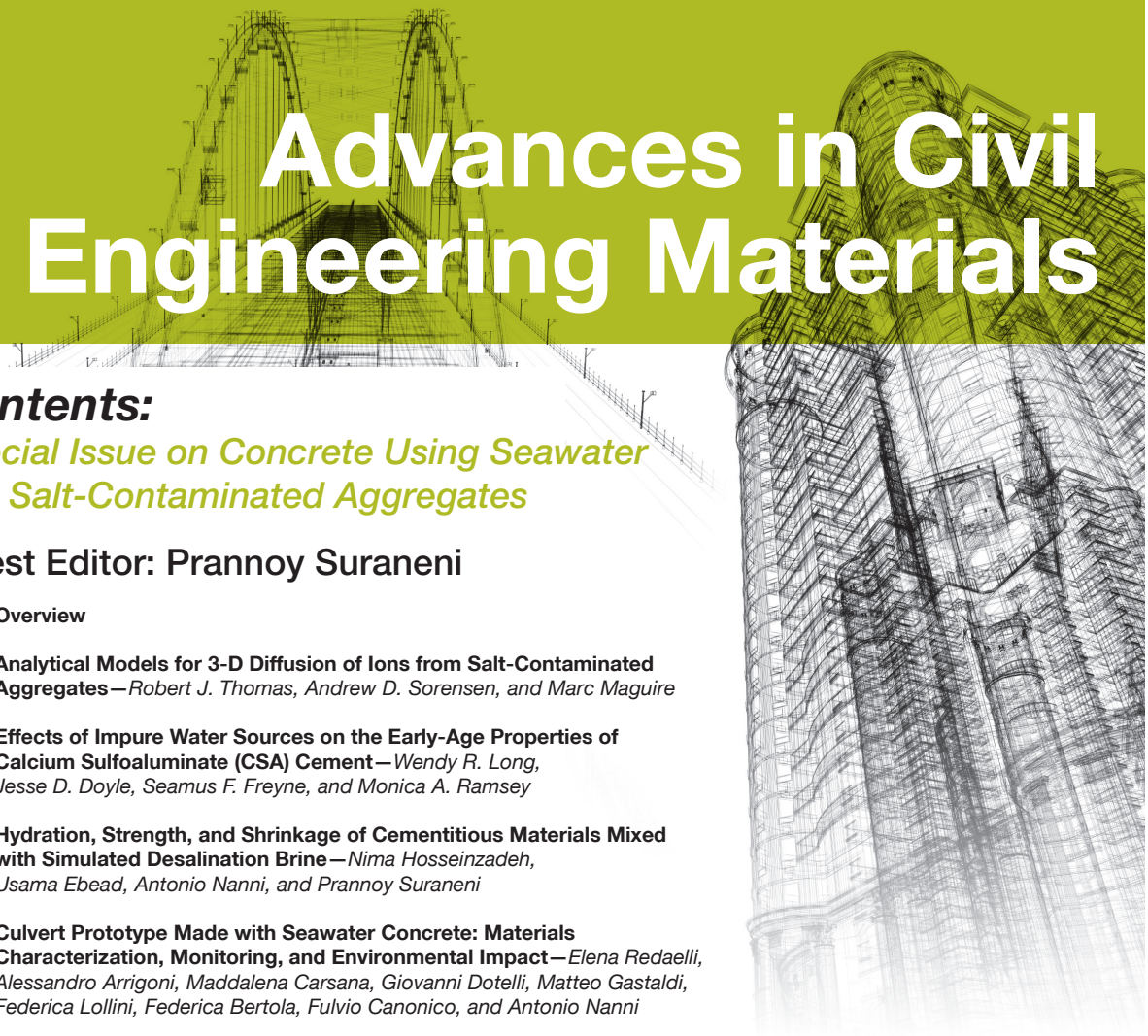

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Special Issue on Concrete Using Seawater and Salt-Contaminated Aggregates

Guest Editor: Prannoy Suraneni

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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 field 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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IN APPRECIATION OF THE REVIEWERS
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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Overview

Special Issue on Concrete Using Seawater and Salt-Contaminated Aggregates

The sustainability of concrete is an important area of research, considering the massive volumes of concrete that are produced daily. For the most part, such research has focused on the replacement/reduction of the cement portion of the concrete. On the other hand, research on the water and aggregates portions of the concrete has not been as extensive. An extremely promising area of research appears to be the use of "contaminated/impure" water and aggregates in concrete, including seawater, brine, and salt-contaminated aggregates. Such research is attractive because of massive shortages of fresh water (and sand), which are becoming increasingly common globally.

The use of seawater for mixing concrete is not a new idea, with some postulating that the ancient Romans used seawater in their concrete mixtures. Duff Abrams studied the effect of seawater (among other impure waters) on concrete strength back in 1924. Unfortunately, the use of such materials in concrete is often not even considered by most researchers and practitioners because of worries regarding corrosion. While corrosion is undoubtably a major and valid concern when using seawater in concrete, a large volume of concrete that is produced is unreinforced; current developments in non-corrosive reinforcement make their use in seawater-mixed concrete a possibility. In principle, the use of seawater (or salt-contaminated aggregates) may be feasible in unreinforced concrete or concrete reinforced with non-corrosive reinforcement. The findings from several papers in this Special Issue and other literature in the past several years certainly seem to suggest the same.

The use of materials such as seawater, salt-contaminated aggregates, alternative cements such as calcium sulfoaluminate cements, and non-corrosive reinforcement such as glass fiber reinforced polymer together can result in concretes that are extremely different from *conventional* portland-cement concretes. The science and engineering of such concrete types is potentially very promising. It is not suggested that these types of concrete will replace conventional concrete; however, they may have significant value in locations such as the Middle East, various coasts and islands, and in post-disaster reconstruction scenarios where fresh water is scarce.

This Special Issue on *Concrete Using Seawater and Salt-Contaminated Aggregates* contains nine papers on cementitious materials made using seawater, brine, other impure waters, and salt-contaminated aggregates. The hydration behavior, compressive strength, other mechanical properties, several durability characteristics including corrosion and shrinkage, diffusion modeling, and life-cycle analysis of these cementitious materials have been explored by the authors. These papers, taken together, provide a significant advance in the fundamental understanding of the science of concrete mixed with seawater and other similar materials. Several challenges remain before widespread utilization of such materials. Two which merit mention are practical/logistic challenges (availability and transport of seawater, variability in seawater and effect on concrete properties,

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and corrosion of mixing equipment) and certain durability aspects (sulfate attack and alkali silica reaction).

This special issue is the result of significant contributions from the authors, reviewers, editors, and the ASTM International publication team and the guest editor gratefully acknowledges these contributions. Specifically, the guest editor would like to sincerely thank (in alphabetical order of their last name) Ms. Alyssa Conaway, Dr. Jason Ideker, Dr. Jason Weiss, and Ms. Sara Welliver, for their guidance and continuous support, without which this special issue would not have seen the light of day.

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