

Advances in Civil Engineering Materials

Contents:

Special Issue on Tests for Set and Stiffening of Cement-Based Materials

iii Overview

- 1 **Decoupling Thermal and Autogenous Strain of Concretes with Different Water/Cement Ratios During the Hardening Process**—*Brice Delsaute and Stéphanie Staquet*
- 23 **Hydration of Cement Pastes Containing Accelerator at Various Temperatures: Application to High Early Strength Pavement Patching**—*Nathan T. Todd, Prannoy Suraneni, and W. Jason Weiss*
- 38 **Using Modified ASTM C403 Test Procedure to Evaluate Set Time and Admixture Compatibility of Shotcrete Mortar**—*Hyunwook Kim, Hoon Moon, Ji-Hyun Kim, and Chul-Woo Chung*
- 53 **Stiffening Behaviors of Cement Pastes Measured by a Vibrational Viscometer**—*Chun-Tao Chen and Chang-Wei Lin*
- 65 **Frequency- and Time-Domain Dependency of Electrical Properties of Cement-Based Materials during Early Hydration**—*H. M. Taha, W. J. McCarter, B. Suryanto, and G. Starrs*
- 84 **Applicability of Ultrasonic Measurement on the Monitoring of the Setting of Cement Pastes: Effect of Water Content and Mineral Additions**—*Mohamed Saleh Mohamed, Jérôme Carette, Brice Delsaute, and Stéphanie Staquet*



ASTM INTERNATIONAL

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, including review papers and technical notes, 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—for example, 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. Papers may present experimental or modeling studies based on laboratory or field observations. Characterization may include chemical composition, nanostructure, and microstructure. Physical properties include, but are not limited to, 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.

Editor-in-Chief

W. Jason Weiss

School of Civil and Construction Engineering
Oregon State University,
Corvallis, OR, USA

Editorial Services

Sara Welliver

Supervisor, Peer Review Services
J&J Editorial Services
201 Shannon Oaks Cir #124
Cary, NC 27511, USA
Tel: 919-650-1459, ext. 210
Email: astm@jeditorial.com

Editorial Board

Mr. Archis Ramesh Ambulkar
Jones & Henry Engineers
Toledo, Ohio

Dr. Xingwei Chen
Louisiana Department of
Transportation and Development
Baton Rouge, LA USA

Shin Che Huang
Western Research Institute
Laramie, WY USA

Dr. Jason H. Ideker
Oregon State University
Corvallis, OR USA

Dr. Eric N. Landis
University of Maine
Orono, ME USA

Dr. Eyal Levenberg
Technion-Israel Institute of
Technology
Technion City, Haifa, Israel

Dr. Phalguni Mukhopadhyaya
University of Victoria
Victoria, BC, Canada

Dr. Amir Poursaeed
Clemson University
Clemson, SC USA

Dr. Prasada Rao Rangaraju
Clemson University
Clemson, SC USA

Dr. Walter J. Rossiter, Jr.
W. J. Rossiter & Associates
Clarksburg, MD USA

Dr. Lin Shen
University of Hawaii at Manoa
Honolulu, HI USA

Dr. Xiang Shu
The University of Tennessee
Knoxville, TN USA

Paul E. Stutzman
National Institute of Standards
and Technology (NIST)
Gaithersburg, MD USA

Dr. Kejin Wang
Iowa State University
Ames, IA USA

Dr. Andreas Wolf
Dow Corning GmbH Wiesbaden
Hessia, Germany

Feipeng Xiao
Tongji University
Shanghai, China

Xiong (Bill) Yu
Case Western Reserve University
Cleveland, OH USA

Dr. Pablo D. Zavattieri
Purdue University
West Lafayette, IN USA

ASTM International's Advances in Civil Engineering Materials is ONLINE.

TAKE ADVANTAGE OF THESE BENEFITS:

- ▶ Search Papers & Authors
 - ▶ View Abstracts
 - ▶ View Table of Contents
 - ▶ Download Individual Papers
- Current subscribers receive online access.
- Non-subscribers can download individual papers for \$25.00 each.

IP access is available. FOR INFORMATION VISIT: www.astm.org

Advances in Civil Engineering Materials (Print ISSN 2379-1357; E-ISSN 2165-3984) is published online by ASTM International. The views expressed in this journal are not those of ASTM International. The data and opinions appearing in the published material were prepared by and are the responsibility of the contributors, not of ASTM International.

Copyright © 2017 by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959.

All rights reserved. This material may not be reproduced or copied, in whole or in part, in any printed, mechanical, electronic, film, or other distribution and storage media without the written consent of the publisher.

Subscriptions include online access. Individual subscriptions: \$252.00 for 1 year online access. Institutional subscriptions (one geographic site via IP access): \$422.00 for 1 year online access. Multisite access also available; please contact sales@astm.org or call 1-877-909-ASTM. To subscribe, please send prepaid order to ASTM International, Customer Service, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959 or visit www.astm.org.

Photocopy Rights: Authorization to photocopy items for internal, personal, or educational classroom use, or the internal, personal, or educational classroom use of specific clients, is granted by ASTM International provided that the appropriate fee is paid to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923; Tel: (978) 646-2600; <http://www.copyright.com/>

Periodicals postage paid at W. Conshohocken, Pa., and at additional mailing offices.

POSTMASTER: Send address change to ASTM International—ACEM, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959.

Printed in the U.S.A.

Visit our website: www.astm.org.

Overview

Special Issue on Tests for Set and Stiffening of Cement-Based Materials

The term “set and stiffening” indicates an increase in stiffness of the fresh cement-based material as a result of hydration. Set is generally used to describe the transition from a liquid (or a slurry) to a solid state, whereas stiffening is used to describe the gradual increase in stiffness caused by development of solid microstructure. The concept of set and stiffening is important because it affects the workability, finishability, and load carrying capacity of the early age cement based materials. However, current standard procedures available for set and stiffening measurements have some drawbacks.

Much research has been performed to develop or to suggest an alternative test method in order to overcome such drawbacks. Electrical measurements (conductivity, capacitance, impedance, etc.), sound wave based approaches (ultrasonic wave transmission, reflection, resonant frequency, etc.), and calorimetric based methods using temperature rise (thermal set) are good examples of such efforts. However, there are still some needs in the construction market to develop a suitable test procedures that are applicable for specific purposes. In this special issue, various test methods for set and stiffening measurements of cement-based materials are presented to introduce current level of knowledge on this topic.

As a guest editor, I deeply appreciate all authors and reviewers who participated in this special issue on “Tests for Set and Stiffening of Cement-Based Materials”. I believe that all the works that are presented in this special issue have a unique contribution and significance. Hopefully, this special issue can be used as good information package for researchers who are actively working in the area of set and stiffening. It would be even better if the information from this special issue can be considered or used to develop a future ASTM standard test procedure.

Finally, I would like to thank Profs. Leslie J. Struble and W. Jason Weiss. It was a great and enjoyable experience for me to work as a guest editor for ASTM. I am also thankful for the assistance provided by ASTM staff members, Alyssa Conaway and Sara Welliver, especially for their endurance in communication delay caused by the time difference between United States and South Korea. Without their help, this special issue could not have been organized as smoothly.

Chul-Woo Chung
Guest Editor



ASTM INTERNATIONAL
Helping our world work better

ISSN: 2379-1357
Stock #: ACEM1702

www.astm.org