

ACI Committee 209 –CREEP AND SHRINKAGE IN CONCRETE
ACI Spring 2014 CONVENTION – RENO, NV
Monday, March 24, 2014
10:00 AM – 1:00 PM
Meeting Room: CASCADE 1
Grand Sierra Resort
Reno, NV

NOTES

1. Opening of the Meeting: Call to Order and Welcome

The meeting was called to order by Chairman Chiorino at 10:07 AM and all in attendance were welcomed to the meeting.

2. Welcome and Introduction of Members

Attendees:

MEMBERS

Mario Chiorino, Chair
Domingo J. Carreira, Secretary
Andy Taylor, TAC Contact
Akthem Al-Manaseer
Matthew D'Ambrosia
Raymond Gilbert
Hesham Marzouk
Hani Nassif
Lawrence Novak
Klaus Alexander Rieder

ASSOCIATE MEMBERS

Tengfei Fu
Brock Hedegaard
Mauricio Lopez
Nam Shiu

VISITORS

Pegter Bischoff
Alana Guzzetta
Roy Harvey
Stuart Malley
Claudio Manissero
Matt. Offenberg
Jim Preskenis
Gianluca Ranzi
Steve Schref
Venkatesh Seshappa

Jerzy Zemajtis ACI Staff

Apologies

Voting members Zdenek Bazant, Gianluca Cusatis, John Gardenr, Carlos Videla, and Roman Wendner

3. Announcements

Next meeting: Monday, October 27, 2014, Hilton Washington, Washington, DC

Changes in membership:

- The updated roster is available at the Committee Website

Other Announcements:

- Al-Manasser informed that his a paper comparing current RILEM and Bazant's Northwestern data banks was accepted for publication on ACI Materials Journal.

4. Approval of Minutes from the Fall 2013 meeting in Phoenix.

Chairman Chiorino asked for review and approval of the minutes from the Fall 2013 meeting in Phoenix. He informed that Secretary Domingo Carreira sent a few remarks. Remarks were incorporated. The new final text was presented to the attendees. There were no other comments. Al-Manaseer moved to approve and D'Ambrosia second. All voting Members voted in favor. Minutes were approved.

5. Status of reports:

- **ACI 209.1R-05** "Report on Factors Affecting Shrinkage and Creep of Hardened Concrete."

Chair Chiorino informed about the Ballot re-approval of the currently-published version for a five year period.

- **ACI 209.2R-08** "Guide for Modeling and Calculating Shrinkage and Creep in Hardened Concrete."

Committee confirmed the decision of waiting before updating ACI 209.2R-08. Chair Chiorino informed that model B4, representing an update of model B3 was currently being presented by Committee member Roman Wendner at the EURO-C conference taking place in St. Anton, Austria the same days of the Committee meeting.-

- **ACI 209.3R-XX**. "Analysis of Creep and Shrinkage Effects in Concrete Structures"

Chiorino, as chair of the Editorial Committee of this document reported that the editorial process intended to meet TAC recent requirements (in particular a specific Chapter 2 devoted to Notations) is in progress. The new edition of ACI 2014 Technical Committee Manual just released during the early morning meeting on Monday, March 24, 2014 of Committee Chairs will be of great help in this final editorial work, as it contains specific chapters like Chapter 7-Development of Guides and Reports, Chapter 8-Formats and Languages for Guides and Reports, Chapter 9-ACI Technical Writing Style, Chapter 10-Notations and Definitions, Chapter, 11-Units of Measurement. These guidelines, if properly followed, will probably avoid a consistent number of TAC comments. The final edited version of ACI 209.3R-XX will be ready for the next Committee meeting in Washington, October 2014, and will then be submitted to TAC by spring –summer 2014.

- **ACI 209.4R-XX** "Test Methods for Creep and Shrinkage", Hani Nassif reported that work is still in progress. A draft will be presented at the fall meeting Washington, October 2014 .

6. Other Business:

- **Subcommittee 209-0B - Influencing Factors**, Mario Sassone
Due to absence of Mario Sassone there was no report.
- **Subcommittee 209-0C - Models Applicability and Uncertainty**, Matthew D'Ambrosia.

D'Ambrosia reported that work has started and he will have a report for the next meeting.

- **Subcommittee 209-0D - Numerical Methods and 3D Analyses**, Roman Wendner.
Roman Wendner could not attend the meeting as he was attending EURO-C conference. He sent information to Chair Chiorino prior to the meeting. Chiorino reported accordingly:

Committee Roster

The preliminary Sub-Committee Roster as of March 2014 is shown in **Attachment A**

Report on Rate Type Models for the Analysis of Creep and Shrinkage

A preliminary draft of the Scope and table of contents of this guide was proposed by Wendner and is presented in **Attachment B**

Special Session and Special Publication “3D Time-dependent Numerical Analyses of Concrete Structures”, ACI Spring 2015 Kansas City Convention

Wendner sent to the chair a form containing the details of the proposed SS and SP, with indication of Moderators, Venue, Scope, Call for Papers (see **Attachment C**).

Abstracts for contributions are requested until June 30.

6. Presentations:

Hesham Marzouk made a presentation between 11:00 and 11:30 on his research on the use of fiber optics sensors for measuring concrete strains in specimens and structures, with special regards to bridges. There was a discussion between 11:30 and 11:48.

8. Adjournment

Hani Nassif moved to adjourn and was seconded by Hesham Marzouk. The meeting adjourned at 11:56 AM

Respectfully submitted by Mario Chiorino and Domingo Carreira.

ATTACHMENT A

ACI Committee 209 “Creep and Shrinkage in Concrete”

Sub-Committee 209-0D Numerical Methods and 3D Analyses

Preliminary Roster, March 2014

Roman Wendner	BOKU Vienna	Voting Member	Chair
Mija Hubler	MIT	Student Member	confirmed
Zdenek Bazant	NU, Evanston	Voting Member	confirmed
Gianluca Cusatis	NU, Evanston	Voting Member	confirmed
Mario Sassone	Politecnico di Torino	Voting Member	under consideration
Jan Vorel	CTU Prague		confirmed
Brock Hedegaard		Student Member	under consideration
Yunping Xi	University Colorado Boulder		confirmed

Report on Rate Type Models for the Analysis of Creep and Shrinkage

Reported by ACI Committee 209-0D

This guide summarizes the state of the art methods to analyze creep and shrinkage utilizing rate type pointwise formulations. The document provides an overview of suitable models and gives detailed information regarding their implementation. This document is written for both, designers and consultants, who are in need of creep and shrinkage predictions for creep sensitive structures on a structural level as well as detailed analyses on a local level. Guidance to an adequate choice of numerical methods is given.

Keywords: creep; shrinkage; integral, rate type.

CONTENTS

Chapter 1—Introduction

- 1.1— Scope
- 1.2— Definition Rate Type vs. Integral, Pointwise vs. Uniaxial
- 1.3— Typical applications, applications that require rate-type

Chapter 2—Notation and definitions

- 2.1—Notation
- 2.2—Definitions

Chapter 3— Overview of Rate Type Models

- 3.1— Model A
- 3.2— Model B
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Chapter 4— Numerical Implementation and Useful Algorithms

- 4.1—Creep
- 4.2—Drying shrinkage
- 4.3—Coupling (autogenous shr, drying shr, creep)
- 4.4—Transformation of code based integral creep laws

Chapter 5—Comparison of numerical approaches

- 6.1—Computational time
- 6.2—Computational accuracy - sample calculation
- 6.3—Shortcomings

Chapter 6—References

ATTACHMENT C

Call for papers:

Moderators:

Roman Wender (BOKU, Vienna, Austria)

Mija Hubler (MIT, Cambridge, MA, USA)

Special Session on: 3D Time-dependent Numerical Analyses of Concrete Structures

Abstract:

The modeling of creep sensitive concrete structures is a demanding and computationally intensive task. In particular during design, a sequence of construction stages and load combinations has to be investigated by sophisticated time-dependent 3D analysis techniques. In fact, the design of many structures such as e.g. cantilever bridges or high-rise buildings is not only characterized by the loading sequence but especially by changes in restraint conditions and the structural system during the construction process. It is essential for the long-term performance and reliability assessment of structures to accurately capture the time-dependent deformability of concrete and thus the interaction of sequences in loading and changes in structural system. During the service life, different challenges associated with changes of use, potentially observed damage, and an increased availability of monitoring information have to be met for performance assessment. It is apparent that computational efficiency as well as the accuracy of the results is quintessential for safe structures that satisfy safety requirements for the entirety of their service life of up to 100 years. Rate-type formulations are ideally posed to capture time-dependent material properties together with changes in the structural system, and environmental conditions. The proposed special session aims at convening the world's experts in the field, inside but also outside the American Concrete Institute, with the goal to collect the most advanced formulations, models, and numerical methods. The assembled contributions will represent the state of science and will provide guidance for the future use of rate type models in both structural design and detailed analyses tasks.

Meeting: Kansas City, MI, Spring 2015 (April 12-15)

Please send abstracts to roman.wendner@boku.ac.at,

Important dates:

Deadline for abstracts: June 30th, 2014

Deadline for papers: December 31st, 2014