CACRCS DAYS 2023

4th Edition

www.cte-eventi.com

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12 September-15 September 2023

Venue: University of Parma, Parma, Italy

Capacity Assessment of Corroded Reinforced Concrete Structures: from Research to Daily Engineering Evaluation

ORGANISATION BY

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Associazione Italiana Calcestruzzo Armato Precompresso

Associazione Italiana di Metallurgia

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fib Italy Young Members Group

Politecnico di Milano

Università degli Studi di Parma

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For more information about the event, please visit the internet website
www.cte-eventi.com/cacrcs/
www.cte-it.org

TOPIC

CACRCS DAYS 2023 edition will focus on practical engineering applications achieved with consolidated research on corroded reinforced concrete and prestressed concrete structures. The main line of the workshop starts from the analysis of material characteristics, moves to the evaluation of the structural behaviour of corroded members, ending with the prediction of the remaining service life of corroded structures.

Since 2019 the Workshop has seen the participation of experts in the capacity assessment of corroded reinforced concrete structures. The workshop is open to young researchers, experts and practitioners.

In the CACRCS DAYS context, professional engineers can find a community of people able to assist in practical problem solving and in decision-making procedures for the assessment and maintenance of existing structures. Moreover, a Round Table will be scheduled to stimulate the debate on the analysis of available codes and guidelines for the evaluation of existing structures and on the gaps and future research fields identified on the basis of the contributions submitted to this workshop.

ORGANIZING COMMITTEE

Coordinators: **Beatrice Belletti (University of Parma), Dario Coronelli (Politecnico di Milano)**

Anna Magri (*CTE)*

David Fernández-Ordóñez (f*ib Secretary General)*

Luc Taerwe (*Ghent University, Editor-in-Chief Structural Concrete Journal)*

Marta Del Zoppo, Lorenzo Franceschini, Biagio Calcavecchia, Marco Carlo Rampini, Simone Ravasini (*fib Italy Young Members Group)*

Benoit Bissonnette *(CRIB - Laval University)*, Claude Rospars (*University Gustave Eiffel*), Carmen Andrade (*CIMNE - UPC*), Walter Kaufmann *(ETH Zurich)*, Jesus Rodriguez (*UPM*), Joost Walraven (*Em. TU Delft*), Takumi Shimomura (*Nagaoka University of Technology*)

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CALL FOR ABSTRACTS

The CACRCS DAYS welcome all contributions related to the behaviour of reinforced concrete, fibre reinforced concrete and prestressed concrete structures damaged by corrosion, with both numerical and experimental approaches, and including some recommendations for the daily engineering evaluation of corroded structures.

You can submit abstracts and papers to the website of the CACRCS event, www.cte-eventi.com/cacrcs/.

PAPER SUBMISSION

Authors willing to present their work at the CACRCS DAYS 2023 are invited to kindly submit an abstract in accordance with the sessions of the workshop. The abstract should not exceed 750 characters and should include some relevant progress with regard to the present state-of the-art.

Extended abstracts (4 pages long) will be reviewed and will be included in the Proceedings of the Workshop if they will be accepted.

The Authors of selected extended abstracts will be invited to submit a full manuscript to a Special Issue of Structural Concrete. The submission of full manuscripts will undergo the usual peer-review process of Structural Concrete.

In order to promote and facilitate the transfer of knowledge from Research to Daily Engineering Evaluation, the template for extended abstracts contains a paragraph dedicated to a description of the use of the presented results in engineering applications. The template for abstracts and extended abstracts is available on the CACRCS website (www.cte-eventi.com/cacrcs/).

AWARDS

Awards will be conferred to the most outstanding paper presented by a *fib* young member and to the most excellent paper presented in the workshop.

IMPORTANT DATES

abstract submission	**28.11.2022**
abstract acceptance notification	15.01.2023
extended abstract submission	28.02.2023
extended abstract acceptance	30.04.2023
final extended abstract submission	30.06.2023
author's registration	30.06.2023
full manuscript submission for a Special Issue of Structural Concrete	28.02.2024

SPONSORS

Companies interested in supporting the event can contact us by e-mail to cacrcs@cte-eventi.com

PRELIMINARY PROGRAM

Special sessions are organised during the workshop. Authors are invited to kindly select the session at which they will present their papers. Each session will include both research and engineering applications focussing on what is needed for the evaluation of corroded structures.
CACRCS DAYS 2023 includes a Round table to promote discussions.
The workshop offers didactic material for engineers, practitioners, scientists, concrete technologists, researchers, and academics to further knowledge about corrosion of reinforced concrete structures.

Tuesday 12 September

Welcome and Introduction

B. Belletti, D. Coronelli, Coordinator Event
Claudio Failla, CTE President
David Fernández-Ordóñez, *fib* Secretary General
Luc Taerwe, Editor-in-Chief of Structural Concrete

A1) Derivation of reliable material models for the analysis of corroded structures

The *Session* deals with the critical revision or the promotion of databases and experimental results coming from corroded elements by referring to accelerated tests, corrosion under natural environment, and the use of empirical expressions adjusted to experimental results.

A2) Models for deteriorated materials: constitutive relationships to be implemented in structural models

The *Session* deals with models for deteriorated materials such as:

- Reinforcing and prestressing steel, by considering:
  - cross section reduction (homogeneous or pitting corrosion)
  - strain reduction at maximum load
  - definition of stress-strain relationships
- Concrete, by considering:
  - cracking
  - compressive strength reduction due to different factors, such as cracking
  - cross section reduction due to different factors, such as spalling
- Bond, by considering:
  - Maximum bond strength
  - bond-slip relationships
  - anchoring in reinforcing bars (plain and ribbed)
  - transfer length and anchorage of prestressing steel

Wednesday 13 September

B1) Analytical models the capacity assessment of corroded members

The *Session* investigates the suitability of models for new structures when applied to the evaluation of existing corroded structures. The Session deals with the modification or the improvement of existing models, based on a-priori hypothesis for new structures to be applied for the capacity evaluation of existing corroded structures
Particular attention will be focused on:

- The structural analysis: linear elastic analysis with limited redistribution, plastic analysis, and non-linear analysis.
- The capacity assessment of reinforced concrete and prestressed concrete members, such as beams, columns, slabs, and/or walls by referring on both serviceability and ultimate limit states and taking into account problems related to the spatial variability of the damage induced by corrosion.
- The assessment of corroded concrete members at ultimate limit states by strut-and-tie models

B2) NLFE models for the capacity assessment of corroded members

The *Session* deals with the Non-Linear Finite Element Modelling of corroded RC and PC structures. Particular attention will be focused on the calibration of the NLFEM on the basis of reliable test results and reliable input values of material characteristics.

Thursday 14 September

C1) Long-term behaviour of corroded concrete structures and determination of the residual service life

The *Session* deals with the extension of models for the evaluation of the present condition of structural elements or corroded structures to predict the long-term behaviour and remaining service life. Particular attention should be focused on the appropriate prediction of corrosion rate values.

Friday 15 September

C2) Upgrading of deteriorated structures by reactive and proactive interventions

The *Session* deals with the analysis of the prolongation of the residual life by reactive and proactive interventions of repairing and strengthening.

Round table on identifying the technical gaps for the structural evaluation of corroded concrete structures for future guidelines and code on short and long-term assessment of corroded structures

Since the main objective of this workshop is to move from research to daily engineering evaluation, this final Round Table aims to exchange some views and comments on the pending technical gaps for the structural evaluation of corroded concrete structures, in spite of the contributions to this workshop, in order to promote some guidelines and codes.

CHAIR: **Joost Walraven**, Em. TU Delft