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Abstract

Modelling of Time-Dependent Behaviour of Corroded Reinforced Concrete Elements †

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† Presented at the First Corrosion and Materials Degradation Web Conference, 17–19 May 2021; Available online: https://cmdwc2021.sciforum.net/.

Abstract: Nowadays, the durability of reinforced concrete (RC) elements affected by corrosion has become a worldwide research topic, especially after some catastrophic failures that have involved corroded structures and infrastructures. One of the main purposes related to durability reduction is the evaluation of the maintenance of adequate safety and residual capacity throughout the life of the structure. Generally, the corrosion deterioration induces cross-sectional area reduction and degradation of mechanical properties of steel and concrete. Furthermore, referring to long-term prediction, creep and shrinkage play a fundamental role on the overall response of RC structures. For this reason, a nonlinear finite element approach, called PARC_CL 2.1 crack model, has been used to investigate the behavior of reinforced concrete elements characterized by corrosion of reinforcements. The PARC_CL 2.1 model is a fixed crack model based on multi-layer shell elements, developed at the University of Parma and implemented in a user subroutine UMAT for ABAQUS. The paper focuses on the modelling description and the comparison between the results of the analysis with the experimental data available in the literature.

Keywords: corrosion; numerical crack model; time-dependent analysis; creep; shrinkage; reinforced concrete

Citation: Vecchi, F.; Franceschini, L.; Belletti, B. Modelling of Time-Dependent Behaviour of Corroded Reinforced Concrete Elements. *Mater. Proc.* **2021**, *6*, 4. https://doi.org/10.3390/CMDWC2021-09957

Academic Editor: Raman Singh

Published: 8 May 2021

Supplementary Materials: The poster presentation is available online at https://www.mdpi.com/article/10.3390/CMDWC2021-09957/s1.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The raw/processed data required to reproduce these findings cannot be shared at this time as the data also forms part of an ongoing study.