Consideration of climate change-induced corrosion by structural codes

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Abstract

The impact of climate change on ambient temperature and relative humidity along with the present CO_2 levels are speeding the corrosion process of reinforced concrete structures. The alarming cost of the associated reduction of the service life of structures, which is estimated to cost 3% to 4% of the Gross Domestic Product (GDP) of industrialized countries, has put the spotlight on the importance of introducing the issue of climate change on the new generation of Eurocodes. Amongst the strategies to tackle the problem, design-phase measures seem not to be always cost-effective, nevertheless, measures during service-life are generally the most expensive. This paper discusses the potential strategies to be addressed by structural codes to tackle the problem of climate change-induced corrosion, considering aspects such as the cost-benefit analysis, viability, and the large uncertainty involved in climate change evolution.

Keywords: Corrosion; Climate change; Maintenance; Eurocodes; Reinforced Concrete.

1 Introduction

Climate change (CC) is imposing an important pressure on all economic sectors worldwide, not only by the need of making these sectors more sustainable but also by the urgency for improving CC resilience. Within the context of the construction sector, which is an important driver of the European economy contributing to about 9% of its GDP, the European Commission has identified that technical standards are effective tools to address the challenging adaptation of European infrastructure to CC, to "incorporate win-win, low-cost and no- regret" adaptation measures [1].

The new generation of Eurocodes, which will be released by 2023, is expected to incorporate the first steps towards the adaptation of the structural design to CC. CC has direct influence on: (a) structural loads, with changes for instance in snow, thermal, and winds loads, and (b) durability of structures and buildings, with a major impact for example on reinforced concrete (RC) corrosion, which is estimated to cause a reduction of the

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