

Master's project in in Concrete Structures,
for the Master Program Structural Engineering and Building Performance Design

Experimental investigation on electrical resistivity of SFRC

Background

Corrosion of reinforcement is one of the biggest problems regarding the durability of reinforced concrete structures. Civil engineering structures like bridges and harbour piers require the use of dense concrete, thick concrete covers and strict crack width limitations due to the risk of chloride induced corrosion. Today, this leads to large reinforcement amounts, which often cause complications in production, but still with difficulties in controlling the surface crack width due to the large concrete cover.

Fibres have mainly been used in buildings or industrial floors, but it could be beneficial to use them also in civil engineering structures, where their crack limiting effects are of interest. Even though it is believed that fibres could be beneficial with respect to chloride ingress and corrosion risk, there are concerns that a decreased resistivity due to the conductivity of fibres may increase the corrosion rate.

Purpose/Method

This master thesis proposal aims to identify how steel fibres influence the resistivity of concrete and whether a measured low resistivity of steel fibre reinforced concrete (SFRC) could increase the corrosion rate of steel reinforcing bars. The influence of the fibres orientation within the concrete matrix, the relative humidity of the environment and the chosen technique to measure electrical resistivity will also be investigated. The outcome of this project will help to develop guidelines for the quality control, or promisingly for service life prediction, of SFRC structures.

The main tasks of this project will include the design of an experimental programme (specimens, materials, setup, equipment, etc.), execution and follow-up of the experiments and documentation of all the procedures and results to include in the final report.

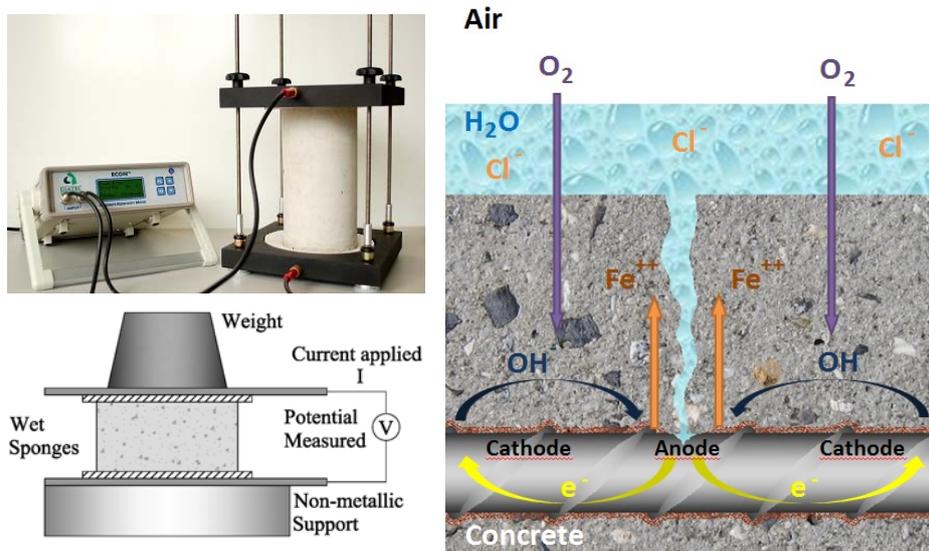


Figure 1. Setup and working principle for resistivity test (left) and schematic representation of the electrochemical mechanism of corrosion of steel in concrete (right)

Thesis setup information

The master thesis will be carried out at Chalmers University of Technology in collaboration with Thomas Concrete Group. This Master Thesis work will be part of an ongoing PhD project and is suitable for students interested in experimental work and concrete technology.

Supervisors

Carlos Gil Berrocal, PhD student, Chalmers, carlos.gil@chalmers.se

Ingemar Löfgren, Adj. Professor, Chalmers, Ingemar.lofgren@tcg.nu

Karin Lundgren, Professor, Chalmers, karin.lundgren@chalmers.se

Tang Luping, Professor, Chalmers, tang.luping@chalmers.se