

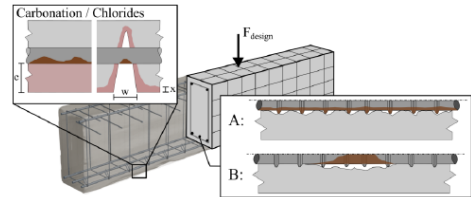
Master Thesis

Computational modelling of chloride transport in cracked reinforced concrete

Supervisor: Dr. Ing. Gerrit Neu and M. Sc. Koussay Daadouch

(Thesis can be written in English or German)

Background: In the framework of the collaborative research center 1683 *Methods of interaction for the modular reuse of existing load-bearing structures*, the structural performance and reliability of reused reinforced concrete elements is investigated. In order to verify a sufficient reliability level over the intended service life, the influence of uncertainties regarding the material properties, ageing and degradation on the load-bearing capacity of a reused structural element need to be assessed.



Task: This master thesis should contribute to the overall project goal by investigating the chloride transportation to predict the chloride concentration level around the reinforcement bars and therewith the service limit state of the structural member:

- Literature review regarding chloride transportation in reinforced concrete, the corresponding material properties, analytical transportation models and concrete exposure class related chloride exposures.
- Set-up of a chloride diffusion simulation to analyse the chloride concentration at the rebar for different exposures (magnitude & distribution) and material properties.
- Analyse the effect of different cracked states (e.g. micro-crack formation, single macro-crack, multiple cracks) on the chloride concentration at rebar level.
- Analyse the influence of aggregates on the chloride transportation mechanism and the chloride concentration at rebar level.
- Derive an analytical expression (modification of the diffusion law) to estimate the chloride concentration based on crack state information.

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