STRUCTURAL MECHANICS

SFB 1683 Modular Reuse

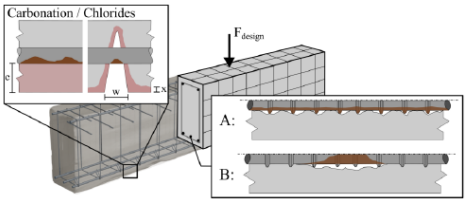
RUB

Master Thesis

Verification of reused reinforced concrete beams with safety concepts for nonlinear FE-Analysis

Supervisor: Dr. Ing. Gerrit Neu

(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 numerically investigating the fracture behaviour of reinforced steel beams under consideration of degradation processes. Furthermore, the computational model should be embedded in existing safety concepts for nonlinear FE-Analysis (NLFEA):

- Literature review regarding safety concepts for NLFEA, degradation processeses in reinforced concrete and their effect on the material parameters over time.
- Definition of multiple exposure scenarios with the corresponding material properties of concrete, reinforcement steel and the bond-slip behaviour to carry out a parametric study.
- Analyse the effect of the defined scenarios on the structural response (load-bearing capacity and crack development) of a reinforced concrete beam subjected to a flexural loading. The investigations are conducted with an existing nonlinear FE-model in KRATOS on a selected benchmark experiment.
- Application of existing safety concepts for nonlinear FE-Analysis on degraded reinforced concrete beams.

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