

# Institut für Baumechanik und Numerische Mechanik

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## Master thesis - *Masterarbeit* for Vorname Nachname Student No.: XXXXXXXXX

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First examiner: Prof. Dr.-Ing. U. Nackenhorst

Supervisor: Vorname Nachname,...

Second examiner: Prof. Dr.-Ing. Vorname Nachname

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### **Modelling of concrete damage under monotonic loading using the finite element method with ABAQUS** *Modellierung von Betonschäden unter monotoner Belastung nach der Finite-Elemente-Methode mit ABAQUS*

Different damage models have been used by the researchers to model the damage of concrete either under tension or compression. One of the most commonly used models is the continuum plasticity-based damage model.

Within the scope of this thesis, the thermodynamic basis, constitutive relations and assumptions of plasticity-damage model are reviewed and then applied to a standard laboratory cylinder concrete specimen using the commercial advanced finite element software ABAQUS under monotonic tensile and compressive loadings and compared with experimental results.

Required knowledge includes an interest in the finite element method and basics of programming. This thesis will be supervised in English.

#### **Literature:**

- [1] ABAQUS, I (2014): Abaqus documentation. Version, 6, 5-1.
- [2] MURAKAMI, S. (2012): Continuum damage mechanics: a continuum mechanics approach to the analysis of damage and fracture (Vol. 185). Springer Science & Business Media.
- [3] LEMAITRE, J., & DESMORAT, R. (2005): Engineering damage mechanics: ductile, creep, fatigue and brittle failures. Springer Science & Business Media.