

Inverse Analysis of additively manufactured Fiber – Reinforced Concretes based on NURBS

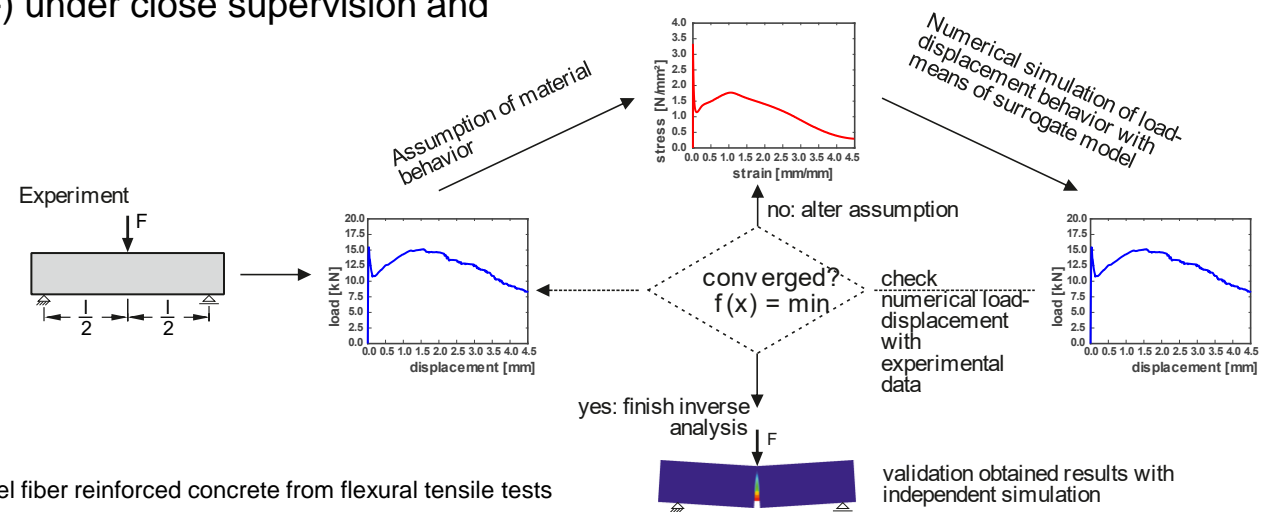
Task

The tensile stress-strain behaviour of concretes cannot be determined directly in practice, therefore flexural tensile tests are carried out on concrete beams and the material behaviour is investigated afterwards by means of models (FEM, surrogate models) and numerical optimisation strategies

- Understand the concept of inverse analysis with respect to fiber reinforced concrete
- Familiarize with the existing source code
- Implement new features of algorithm in Python 3.9+ (and/or C++) under close supervision and quick feedback
 - NURBS – Integration to obtain cross-sectional forces
 - Sensitivity – Analysis
 - Automated parameter studies
 - Initial Variable Estimation
- Monitor code performance and optimize runtime
- (optional & voluntary) participation in the 3D printing of concrete test specimens with a KUKA industrial robot

Project Characteristics

Modeling:	<div style="width: 20%; height: 10px; background-color: blue;"></div>
Mathematics:	<div style="width: 40%; height: 10px; background-color: blue;"></div>
Programming:	<div style="width: 80%; height: 10px; background-color: blue;"></div>
Science:	<div style="width: 25%; height: 10px; background-color: blue;"></div>



[1] D. Auer, J. Landler and O. Fischer, "Derivation of the centric tensile stress-crack width relationship of steel fiber reinforced concrete from flexural tensile tests using B-Splines", Bauingenieur, vol. 94, no. 11, pp. 451-460, 2019, doi: doi.org/10.37544/0005-6650-2019-11-65.