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PHASE-FIELD MODELING FOR DAMAGE IN STEEL-FIBER REINFORCED HIGH PERFORMANCE CONCRETE AT LOW CYCLE FATIGUE: NUMERICAL CALIBRATION AND EXPERIMENTAL VALIDATION

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High performance concrete (HPC) is one of the emerging type of new innovative concrete. The reinforced fibers in HPCs restrain the further growth of crack by transmitting the stresses from concrete matrix to fibers during fracture which affects the deterioration characteristics of concrete in cyclic flexural tests. On this account, within DFG priority program 2020 (SPP 2020), strong research is focused on the experimental and numerical analysis of failure of HPC under fatigue. In this contribution, a phenomenological material model is developed combining the superposed models of transversal isotropic elasto-plasticity, see [1] and a continuum phase-field model based on the variational formulation of fracture in elasto-plastic material, cf. [2, 3, 4]. Two different data driven degradation functions for the modeling of unique behavior of HPC in tension and compression are calibrated by simulating the typical uniaxial cyclic tests. The numerical model is calibrated and validated by comparing the numerical results of three-point bending beam test at low cycle for pure and reinforced HPCs to experimental data, see [5].

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