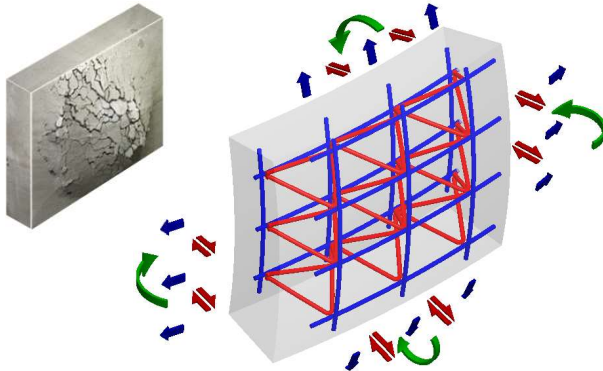


Duy M. P. Vo – Doctoral Project A1/I

ENGINEERING AND EVALUATING OF 3D FIBER-BASED REINFORCEMENTS FOR MINERAL-BONDED COMPOSITES WITH ENHANCED IMPACT TOLERANCE

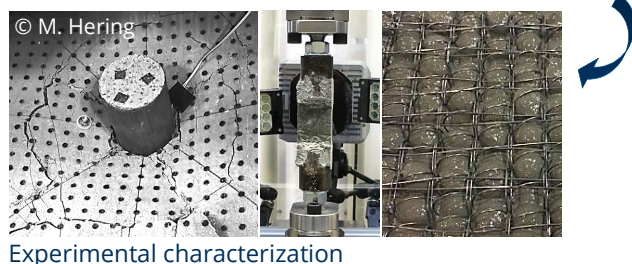
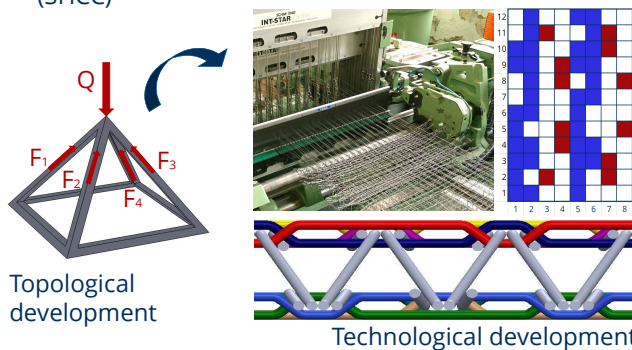
1 OBJECTIVES

- Development of methods and models for designing fiber-based cellular 3D reinforcements to enhance the impact tolerance of mineral-bonded composites
- Characterizing and evaluating the efficiency of 3D reinforcements in composites under impact loading
- Deriving the material-structure-property relationship



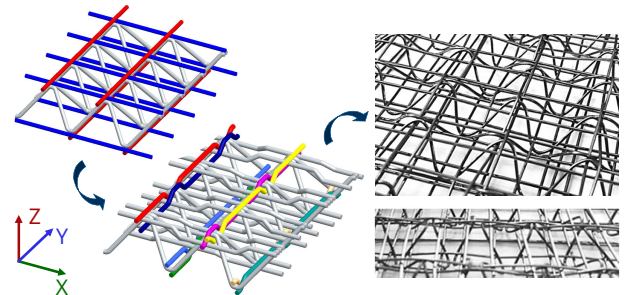
2 METHODS

- Systematic development of 3D reinforcement topology
- Theoretical evaluation of developed structures
- Technological development for the manufacture of 3D reinforcements based on weaving process
- Experimental characterization and evaluation of 3D reinforced strain-hardening cement-based composites (SHCC)

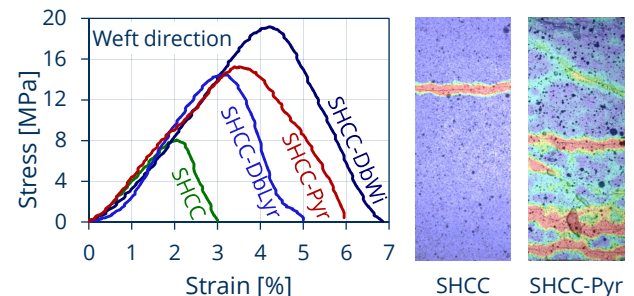


3 RESULTS

- Model-supported manufacture of cellular 3D structures with varied through-the-thickness reinforcing elements (pyramidal structure) using a novel weaving technology



- Investigating SHCC reinforced with various 3D cellular structures under quasi-static and impact tensile loading
- Significantly enhanced strength, deformability and energy absorption capacity with 3D reinforcements
- Exploiting positive synergy of material and structural performance using pyramidal 3D reinforcement



- Optimizing reinforcing efficacy using hybrid 3D structures consisted of metallic and polymeric high-performance materials

4 COLLABORATIONS

- C. SENNEWALD (assoc. Postdoc A1): Development of 3D fiber-based reinforcements
D. MP. Vo et al. Int. J. Archit. Civ. Constr. Sci. (2018)
- T. GONG (A3/I); I. CUROSU (Postdoc): Experimental study on tensile behavior of 3D reinforced SHCC
I. CUROSU et al. Beton und Stahlbetonbau (2021)
- M. HERING (A5/I) : Experimental study on structural impact safety based on mineral composites
M. HERING et al. Beton und Stahlbetonbau (2021)
- T. GONG (A3/I), I. CUROSU (Postdoc), K. ZIEROLD (assoc. A1): Manufacture of UHMWPE 2D reinforcing structure
T. GONG et al. Materials (under review)
- E. WÖLFEL (A2/I) : PP short fiber production