Structural integrity under extreme loads

Topic: High fidelity models and machine learning

TITLE: Numerical analysis of composite representative volume elements and development of machine learning-based surrogate models

RESEARCH BACKGROUND:

Composite materials are intrinsically multiscale materials that present multiple failure modes, which are challenging to describe through FE models. Numerical simulations may be combined with state-of-the-art machine learning methods to improve the computational efficiency and accuracy.

RESEARCH ACTIVITIES:

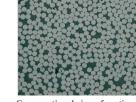
- 1. Numerical development of reference volume elements (RVEs) for composite materials (focus on interfacial properties fibre/matrix)
- 2. Investigation of state-of-the-art homogenization techniques for deriving the macro properties of RVEs.
- 3. Development of machine learning methods to replace computationally expensive numerical simulations.
- 4. Testing of the methodology on experimental and numerical data.

METHODOLOGY: Numerical

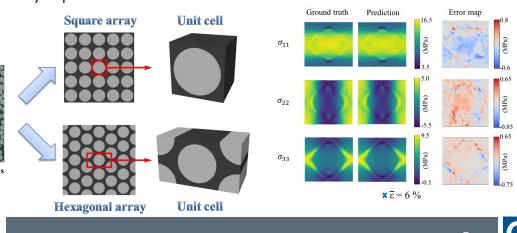
DURATION: 9 months

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Cross-sectional view of continuous fiber reinforced composites



POLITECNICO MILANO 1863

