VIPER (VIrtual Ply propERty)

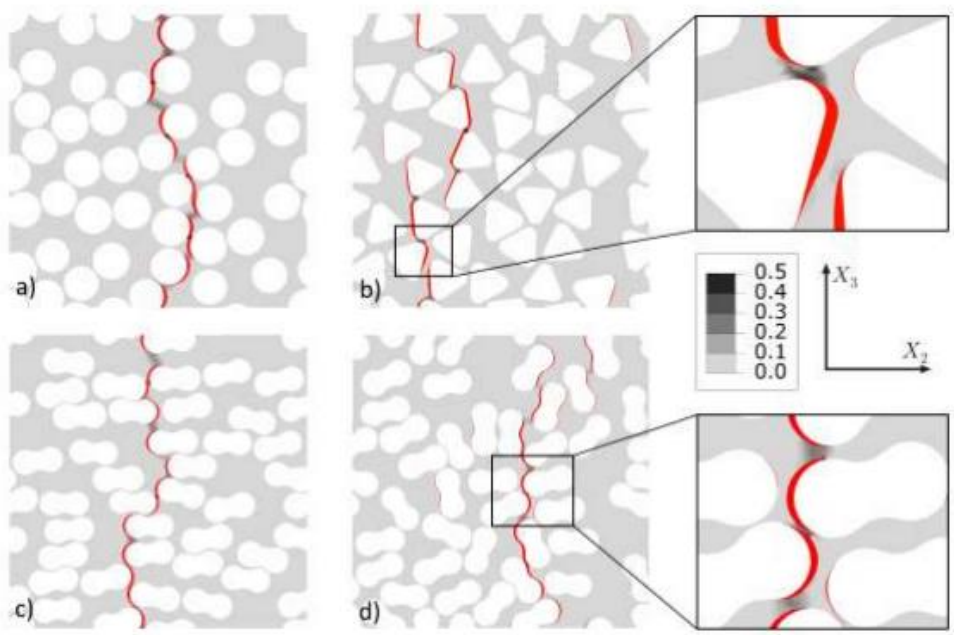
Software description

VIPER (VIrtual Ply propERty) is a simulation tool developed within the framework of computational micromechanics by IMDEA Materials to expedite the prediction of fiber-reinforced ply behavior from the measured properties and spatial distribution of the different phases and interfaces in the composite. The tool is also able to generate composite microstructures with arbitrary fiber geometries as well as hybrid microstructures hence allowing for in-silico ply property screening, design and optimization.

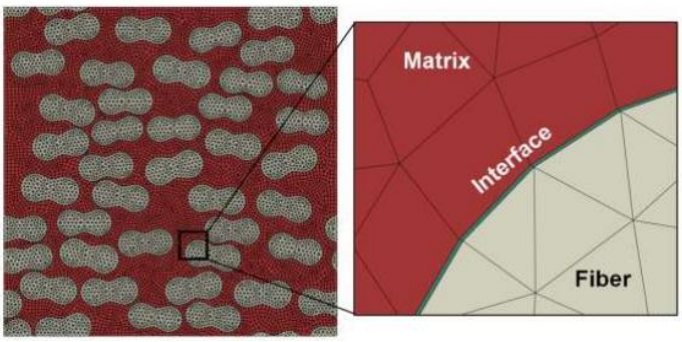
VIPER is a ready-to-use software package developed using Python which includes a Graphical User Interface. It uses a fiber repelling approach to generate hybrid microstructures with high fiber volume fractions. The tool also includes capabilities to calculate the relevant statistical microstructure descriptors.

The microstructures generated by VIPER need to be exported to Finite Element software packages such as ABAQUS to perform RVE computations and predict composite ply behavior

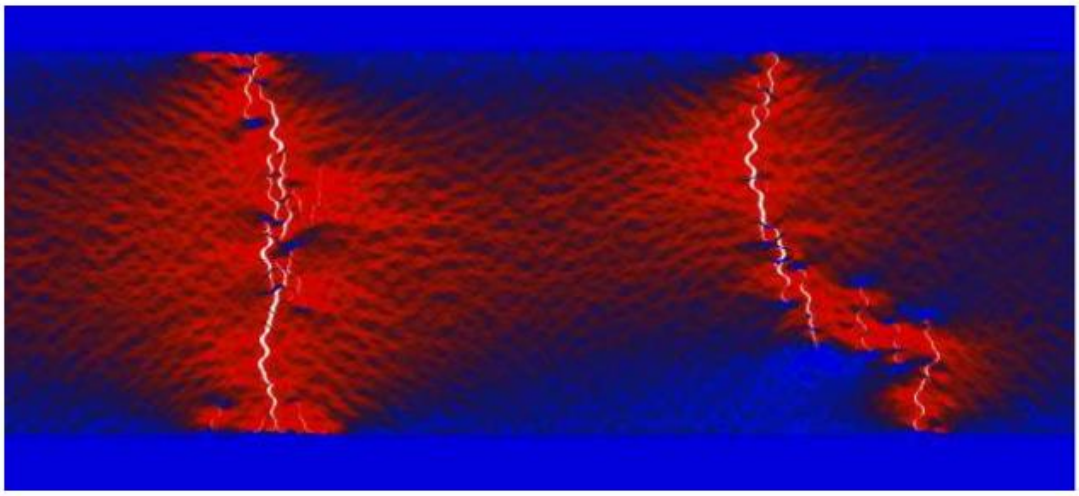
VIPER capabilities



Simulation of transverse tensile cracking in circular, triangular and lobular microstructures to determine nominal transverse ply strengths



Microstructure Finite Element Model generation



Simulation of transverse tensile cracking of an embedded circular-fibre cross-ply to determine in-situ transverse ply strength

Supplementary data

Transfer Opportunity: Software license

Reference: M. Herraez et al., "*Computational micromechanics evaluation of the effect of fibre shape on the transverse strength of unidirectional composites: An approach to virtual materials design*", Composites Part A, 2016.

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