



ICAMS Seminar

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On the construction of statistical similar representative volume
elements for two-phase materials

The FE2 method, also known as direct micro-macro transition, is a suitable numerical tool for direct incorporation of micromechanical information. A drawback of these direct homogenization methods is the high amount of memory and high computation time when applying them to large random microstructures. In this context, the definition of a statistically similar representative volume element (SSRVE), which is characterized by a significantly reduced complexity compared with real microstructures, leads to more efficient procedures. Therefore, we propose to construct such SSRVEs based on the minimization of a least-square functional considering the differences of suitable statistical measures characterizing the inclusion morphology of a given real microstructure and of the SSRVE. In 2D the construction of SSRVEs proves to be successful in a series of numerical examples. The next step is the extension of this method to the construction of three-dimensional SSRVEs.

Therefore, we consider the phase fraction, the spectral density and the lineal-path function with respect to the inclusion phase for the evaluation of the least-square functional. As a target structure we use a real microstructure of a Dual-Phase steel which is obtained from 3D measurements based on Electron Backscatter Diffraction (EBSD) combined with a Focused Ion Beam (FIB).

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