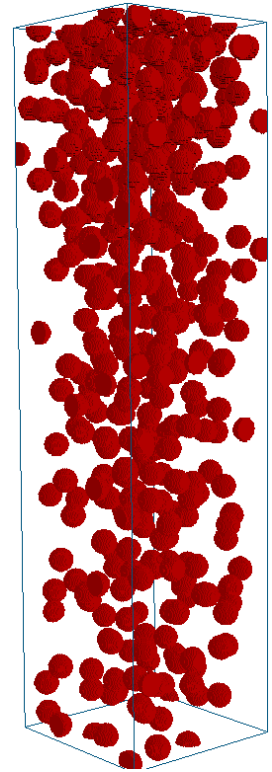




Generation of artificial microstructures with graded properties

Many materials show graded microstructures. For example, the grain size in polycrystals can be different close to the surface of a part. In this work we focus on composite structures made of metal with ceramic particles. The particles are deposited on the surface and locally penetrate into the material. Thereby a gradual decrease of the particle volume fraction in thickness direction is obtained.

In order to numerically investigate this type of material, artificial microstructures are required. These microstructures should be generated by a randomized process involving repulsive forces. The parameters of the algorithm should allow for tunable depth-dependent particle volume fraction. Different output formats (e.g., VTK for direct visualization; GMSH and Netgen format for mesh generation) shall be provided. Additionally, the statistical properties of the composite (e.g. two-point correlation functions, ...) are subject of investigation.



preliminary example

Requirements

- programming skills (C/C++ and/or MATLAB)
- basic knowledge in numerical simulations
- preliminary knowledge in data analysis is advantageous

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