



## Lattice Boltzmann Method for PAKKA-Model Structures in Fluid Flow Motion

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### Abstract

*In the Lattice Boltzmann method particles are generally allowed to move and collide on the lattice. The rules governing the collisions are designed in such a way that the time-average motion of the particles is consistent with the Navier-Stokes equations. The Lattice Boltzmann method has multiple the advantages as its time and space efficient calculations are forwarded to parallelize, it handles the complex boundaries without any difficulty and it directly links the microscopic and the macroscopic phenomena.*

*By the Lattice Boltzmann simulations there are the examination of quality of the numerical models of the porous media and tomographic imaging techniques. The different models were taken to give the qualitatively dependence of permeability on porosity, but it also effects of other structural properties were shown. These include specific surface area, tortuosity, shape and orientation of particles in the medium. The transverse and in-plane flow simulations for PAKKA-model samples augmented the characteristics of samples and the solutions e.g., effect of the fibre flexibility. The simulations show that results on paper can be sensitive to imaging techniques, since the differences in permeability between high and low-resolution images can be seen though results within each technique were consistent. The graphs and table indicate the dependency and variation of porosity on Darcy permeability and tortuosity.*

**Keywords:** Lattice-Boltzmann method, Multiphase flow, PAKKA-model structure.

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