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Toward an Adaptive Mesh Refinement LBM for rough and porous media modelling[1] MIKAEL GRONDEAU, RALF DEITERDING, Univ of Southampton — Flows over porous and rough media can be found in nature and in industrial devices. The combination of permeability and roughness effects leads to an outer flow that is significantly different than flows over impermeable flat or rough walls. However, the phenomena at play are still not fully understood. We employ the lattice Boltzmann method (LBM) with D3Q27 operator and adaptive mesh refinement (AMR) to enable accurate computation of turbulent structures generated by the porous medium. The aim of this paper is to assess the ability of LBM-AMR coupled with large eddy simulation (LES) to capture the flow in and over two porous media configurations. All calculations are made with our AMROC software. The first configuration consists of two layers made of spheres and is described in Stoesser (2006). The Reynolds number is 17,630. The second configuration is described in Kuwata (2016) and the porous media is made of several interlaced cubes layers. The Reynolds number is 2,900. Simulations realized with a Smagorinsky model accurately capture the flow outside of the porous media. However, some discrepancies, compared to the reference results, are still observed inside the media. More advanced LES models are introduced to improve the predictions of our LBM-AMR solver.

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