Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Discrete Particle Model for Porous Media Flow using OpenFOAM at Intel Xeon Phi Coprocessors[1] ZHI SHANG, Center for Computation and Technology, Louisiana State University, LA 70808, USA, KRISHNASWAMY NANDAKUMAR, Cain Department of Chemical Engineering, Louisiana State University, LA 70802, USA, HONGGAO LIU, Center for Computation and Technology, Louisiana State University, LA 70808, USA, MAYANK TYAGI, Department of Petroleum Engineering, Louisiana State University, LA 70808, USA, JAMES A. LUPO, Center for Computation and Technology, Louisiana State University, LA 70808, USA, KARTEN THOMPSON, Department of Petroleum Engineering, Louisiana State University, LA 70808, USA — The discrete particle model (DPM) in OpenFOAM was used to study the turbulent solid particle suspension flows through the porous media of a natural dual-permeability rock. The 2D and 3D pore geometries of the porous media were generated by sphere packing with the radius ratio of 3. The porosity is about 38% same as the natural dual-permeability rock. In the 2D case, the mesh cells reach 5 million with 1 million solid particles and in the 3D case, the mesh cells are above 10 million with 5 million solid particles. The solid particles are distributed by Gaussian distribution from 20 μm to 180 μm with expectation as 100 μm. Through the numerical simulations, not only was the HPC studied using Intel Xeon Phi Coprocessors but also the flow behaviors of large scale solid suspension flows in porous media were studied.

[1]The authors would like to thank the support by IPCC@LSU-Intel Parallel Computing Center (LSU # Y1SY1-1) and the HPC resources at Louisiana State University (http://www.hpc.lsu.edu).

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Date submitted: 17 Jul 2015 Electronic form version 1.4