Evaluation of oil contamination in porous media by X-ray CT image analysis and LBM simulation

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Mechanism of oil contamination in a porous media is complex due to flowing because some oil should be flushed by water movement or some oil should be trapped. These mechanics is caused by the capillary force and it should be exerted by three items: pore diameter, pore shape and connectivity. Hence, it has a great influence to the oil flow. Nowadays, µ-focus X-ray CT can evaluate first two items applying adapt image processing. Besides, the clarification to flow dynamics will require mechanical properties and indentation velocity of fluid with viscosity ratio between the fluids, the interaction force, and wetting properties such as contact angle.

Lattice Boltzmann Method (LBM) may be relatively easy to introduce the boundary conditions for the boundary complexity. In addition, LBM has the high adaptability to a two-phase flow issue, so the research results by for instance, two-phase flow in porous material such as soil materials can be calculated including the movement of the fluid interface between two phases for the oil - water. The purpose of this study is to elucidate the me-
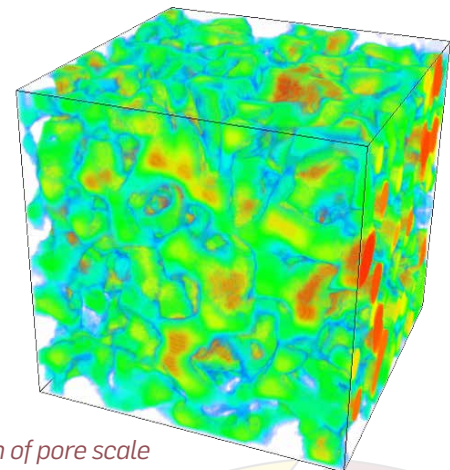
3-D distribution of pore scale

chanism of water-oil flow in porous materials. Therefore LBM simulation was implemented using by pore structural data that is extracted from CT image. In this presentation, authors simulate capillary behavior of a light non-aqueous phase liquid (LNAPL) with different capillary number (Ca) and then, trapped LNAPL will be simulated by water injecting after LNAPL distributed in the glass beads. In this presentation, LBM simulation to artificial image with regular arrangements and to X-ray CT image of glass beads would be conducted and their results are discussed.

Guests are welcome!

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