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3D Reconstruction and permeability calculation from 2D thin sections

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Permeability prediction of porous media is be of great significance for both petroleum and environment fields. The permeability of a porous medium can be directly calculated based on one 2D thin section. However, it is often doubtful. Therefore, a new technique of the permeability prediction from a 2D thin section is proposed. First 3D porous media is reconstructed from a 2D image using multiple-point statistics. Then the single- and two-phase flow simulations are carried out based on the reconstructed 3D porous media. The absolute permeability is calculated by computing Navier-Stokes equation and Darcy's law. The relative permeability is predicted using pore network method. In order to validate the method, the permeability calculation results are compared with them which are computed from the 3D real porous medium obtained using micro-CT scanner. The comparison shows that the technique is reliable, which offers petroleum and environment researchers a novel method for predicting the permeability when a 2D thin section is available.

References

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