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The Fluid Flow Motion through Porous Media for Slightly Compressible Materials

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Abstract

The multiphase flow in porous media is a topic of various big complexities for a long time in the field of fluid mechanics. This is a subject of important technical applications, most probably in oil recovery from petroleum reservoirs and also in others. The single phase fluid flow through a porous medium is generally defined by Darcy's law. In the petroleum industry and in other technical applications, the transport phenomenon is modeled by postulating a multiphase analysis of the Darcy's law. In this analysis, the distinct pressures are defined for each phase with the difference and well known as capillary pressure. That is determined by the interfacial tension, geometry of micro pore and the chemistry of the surface related to the solid medium. In regarding flow rates, the relative permeability is defined that gives the relationship between the volume flow rate of each fluid and the pressure gradient. In the present paper, there is an analysis about the mathematical laws and equations for the slightly compressible flow and rock and the analysis and important results have been founded. The analysis show that velocity of fluid related to any phase is inversely proportional to the viscosity of the fluid. The capillary pressure of the capillary tube is inversely proportional to the radius of tube and increases with increasing values of the surface tension of the fluid. It also varies inversely with the radii of curvature for the interface of the fluid. The pressure exerted by the fluid varies positively with its velocity and varies inversely with the absolute permeability of the porous medium.

Keywords: Multiphase flow motion, Porous media, Darcy's law, Compressible rocks.

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