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Mohamed F. El-Amin, Jisheng Kou, Shuyu Sun

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# Discrete-Fracture-Model of Multi-Scale Time-Splitting Two-phase Flow Including Nanoparticles Transport in Fractured Porous Media

Mohamed F El-Amin<sup>a,b,c</sup>, Jisheng Kou<sup>d</sup>, Shuyu Sun<sup>c</sup>

<sup>a</sup>College of Engineering, Effat University, Jeddah 21478, Kingdom of Saudi Arabia.

<sup>b</sup>Mathematics Department, Faculty of Science, Aswan University, Aswan 81528, Egypt.

<sup>c</sup>Computational Transport Phenomena Laboratory (CTPL), Division of Physical Sciences and Engineering (PSE), King Abdullah University of Science and Technology (KAUST), Thuwal, Kingdom of Saudi Arabia.

<sup>d</sup>School of Mathematics and Statistics, Hubei Engineering University, Xiaogan 432000, Hubei, China.

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## Abstract

In this article, we consider a two-phase immiscible incompressible flow including nanoparticles transport in fractured heterogeneous porous media. The system of the governing equations consists of water saturation, Darcy's law, nanoparticles concentration in water, deposited nanoparticles concentration on the pore-wall, and entrapped nanoparticles concentration in the pore-throat, as well as, porosity and permeability variation due to the nanoparticles deposition/entrapment on/in the pores. The discrete-fracture model (DFM) is used to describe the flow and transport in fractured porous media. Moreover, multiscale time-splitting strategy has been employed to manage different time-step sizes for different physics, such as saturation, concentration, etc. Numerical examples are provided to demonstrate the efficiency of the proposed multi-scale time splitting approach.

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