InterPore2022

Monday 30 May 2022 - Thursday 02 June 2022

InterPore2022 Hybrid

جامعــة خليفــة
Khalifa University

14th Annual Meeting
30 May - 02 June 2022
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Book of Abstracts
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MS14 / 511

Improving the efficiency of reservoir simulations with the Multi-scale Perturbation Method for Two-Phase Flows

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The Multiscale Perturbation Method for Two-Phase Flows (MPM-2P, 1) is a procedure based on the Multiscale Perturbation Method (MPM, [2]) that uses classical perturbation theory to efficiently approximate velocity fields in the numerical solution of two-phase flow problems. We consider an operator splitting strategy, where a scalar conservation law for the saturation of one of the phases and the velocity field are updated sequentially. The velocity field is approximated by multiscale mixed methods, which allow for the global solution to be computed on a coarse mesh, while detailed basis functions are defined locally in a fine grid. The formulation of the MPM-2P introduces a modification on the operator splitting method to replace full updates of local solutions by reusing multiscale basis functions computed at an earlier time of the simulation. The new procedure provides a significant reduction of the computational cost in the approximation of challenging flow problems, while the accuracy is controlled by a tolerance criterion. Our numerical experiments demonstrate an exceptional speed-up of almost 90% of reduction in the computational cost of two-phase flow simulations with the MPM-2P.

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Brazil **References**:

1 F. F. Rocha, H. Mankad, F. S. Sousa, F. Pereira. The multiscale perturbation method for two-phase reservoir flow problems, Applied Mathematics and Computation, (2021): 126908.

[2] A. Ali, H. Mankad, F. Pereira, F. S. Sousa. The multiscale perturbation method for second order elliptic equations, Applied Mathematics and Computation, 387 (2020): 125023. **Time Block Preference**:

Time Block C (18:00-21:00 CET) **Participation**:

Online

MS08 / 512

Inertia and 3D Flow Effects on Mixing and Reaction at Channel Intersections

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