Contribution ID: **899** Type: **Oral Presentation**

A linear iterative scheme for reactive flow in a porous medium

Thursday, 25 May 2023 09:15 (15 minutes)

We consider a mathematical model for saturated flow and reactive transport in a porous medium. In this model, the absolute permeability of the medium depends on the solute concentration. Due to this, the fluid velocity depends on the unknown concentration. On the other hand, the solute is transported by the fluid, so the concentration is dependent on the fluid velocity. This yields a fully coupled system of nonlinear partial differential equations.

After appying an implicit Euler time stepping, one obtains a sequence of nonlinear, fully coupled time-discrete systems of elliptic equations. We propose a robust, linear iterative scheme for the numerical approximation of the solution to the time discrete systems. By adding some linear stabilization terms, one not only makes the scheme linear, but the two components of the model, the flow and the reactive transport of the solute, can be decoupled. Under a mild restriction on the time step, we prove the convergence of the iterative scheme. This convergence holds regardless of the spatial discretization and mesh.

Participation

In-Person

References

MDPI Energies Student Poster Award

No, do not submit my presenation for the student posters award.

Country

Belgium

Acceptance of the Terms & Conditions

Click here to agree

Energy Transition Focused Abstracts

Primary authors: Prof. POP, Iuliu Sorin (Hasselt University); Mr VAES, Wietse (University of Washington); VERMOLEN, Fred (University of Hasselt)

Presenter: Prof. POP, Iuliu Sorin (Hasselt University)

Session Classification: MS07

Track Classification: (MS07) Mathematical and numerical methods for multi-scale multi-physics, nonlinear coupled processes