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A Lagrange multiplier method for the fully dynamic Navier-Stokes - Biot system

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We develop a mixed finite element computational model for the interaction between a free fluid and a poroelastic medium. The free fluid flow is governed by the time-dependent incompressible Navier-Stokes equations, while the poroelastic region is governed by the Biot system. A Lagrange multiplier method is employed to impose weakly the continuity of flux. Under a small data condition, existence, uniqueness, and stability of the semi-discrete continuous-in-time and fully discrete formulations are proved. We further establish error estimates for the fully discrete method. A series of numerical experiments are presented to verify the theoretical convergence rates and illustrate the applicability of the method to modeling arterial blood flows.

Participation

In-Person

References

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Energy Transition Focused Abstracts

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