



Contribution ID: 633

Type: **Oral Presentation**

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

*Thursday 25 May 2023 09:45 (15 minutes)*

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

### MDPI Energies Student Poster Award

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

### Country

USA

### Acceptance of the Terms & Conditions

[Click here to agree](#)

### Energy Transition Focused Abstracts

**Authors:** YOTOV, Ivan (University of Pittsburgh); Dr WANG, Xing (Penn State University)

**Presenter:** YOTOV, Ivan (University of Pittsburgh)

**Session Classification:** MS07

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