

# Mathematical Models and Numerical Methods for Multiphysics Systems

May 1-3, 2024,  
O'Hara Student Center, University of Pittsburgh

## Conference Schedule

### Wednesday, May 1st

**8:30 - 8:50** Registration

**8:50** Opening

#### Session 1

**9:00 - 9:45** Gabriel Gatica

*Banach spaces-based mixed formulations for multiphysics systems in fluid mechanics*

**9:45 - 10:30** Luca Formaggia

*Application of model order reduction technique to subsurface flows*

**10:30 - 11:15** Coffee Break

#### Session 2

**11:15 - 12:00** Martin Vohralík

*An application of the Gronwall lemma avoiding exponential of the final time: a posteriori error estimates for the Stefan and Richards problems*

**12:00 - 14:00** Lunch Break (lunch provided)

#### Session 3

**14:00 - 14:45** Jan Nordbotten

*Momentum-balancing discretizations of linearized Cosserat materials and elasticity*

**14:45 - 15:30** Martina Bukač

*A diffuse interface method for fluid-poroelastic structure interaction*

**15:30 - 16:15** Coffee Break

#### Session 4

**16:15 - 17:00** Sorin Pop

*Linear iterative schemes for degenerate parabolic equations*

**17:00 - 17:45** Costanza Aricó

*Solution of the (Navier)-Stokes-Brinkman equations using  $H(\text{div})$ -velocity fields and recent extensions in the framework of multipoint flux mixed finite element method*

**18:00 - 21:00** Conference Dinner – University Club Gold Room

## Thursday, May 2nd

### Session 1

**9:00 - 9:45** Erik Burman

*An abstract framework for heterogeneous coupling: stability approximation and applications*

**9:45 - 10:30** Annalisa Quaini

*A FEM for a phase-field model of two-phase incompressible surface flow with electrostatic interaction*

**10:30 - 11:15** Coffee Break

### Session 2

**11:15 - 12:00** Miguel Fernández

*Mechanically consistent modeling of fluid-structure-contact interaction*

**12:00 - 14:00** Lunch Break and Poster Session (lunch provided)

### Session 3

**14:00 - 14:45** Sunčica Čanić

*From vascular stents to bioartificial organs: multi-layered poroelastic media interacting with incompressible fluids*

**14:45 - 15:30** Marcio Murad

*A fixed-stress-split scheme for a black-oil multiphysics flow model in poroelastic media*

**15:30 - 16:15** Coffee Break

### Session 4

**16:15 - 17:00** Ingeborg Gjerde

*Network models for the flow of CSF in the brain*

**17:00 - 17:45** Johnny Guzmán

*A second-order correction method for loosely coupled discretizations applied to parabolic-parabolic interface problems*

**Friday, May 3rd**

*Session 1*

**9:00 - 9:45** Martin Schneider

*Coupling free and porous media flows at the pore and the REV scales*

**9:45 - 10:30** TongTong Li

*An augmented fully-mixed formulation for the quasistatic Navier-Stokes-Biot model*

**10:30 - 11:00** Coffee Break

*Session 2*

**11:00 - 11:45** Miroslav Kuchta

*Robust iterative solvers for brain glymphatics*

**11:45 - 12:30** Sergio Caucao

*Velocity-vorticity-pressure mixed formulation for the Kelvin-Voigt-Brinkman-Forchheimer equations*

**12:30 - 14:00** - Lunch Break (lunch provided)

**14:00 - 14:30** Closing Discussion

## Poster Presenters

Lucas Bouck, *Carnegie Mellon University*

*Finite element approximation of a membrane model of liquid crystal polymer networks*

Aytekin Cibik, *Gazi University*

*Continuous data assimilation for a system of Darcy-Brinkman equations*

Maicon Correa, *Unicamp - University of Campinas*

*A semi-discrete central-upwind scheme for the transport of components in a poroelastic-black-oil model*

Aashi Dalal, *University of Pittsburgh*

*A Banach space formulation for the Navier–Stokes/Biot coupled problem*

\* *A Robin-Robin splitting method for the Stokes-Biot fluid-poroelastic structure interaction model*

Rui Fang, *University of Pittsburgh*

*Numerical analysis of locally adaptive penalty methods for the Navier-Stokes equations*

Connor Parrow, *University of Notre Dame*

*Refactorization of Cauchy's method: a second-order partitioned method for fluid-poroelastic material interaction*

Vedant Puri, *Carnegie Mellon University*

*Nonlinear model order reduction with smooth neural fields*

Andrew Scharf, *UC Berkeley*

*Interaction between a fluid and a multilayered poroelastic structure with membrane*

Farjana Siddiqua, *University of Pittsburgh*

*Variable time step method of Dahlquist, Liniger, and Nevanlinna (DLN) for a corrected Smagorinsky model*

Henry Von Wahl, *Friedrich Schiller University Jena*

*A coupled fracture fluid-structure interaction framework*

Ibrahim Yazici, *University of Pittsburgh*

*Multipoint stress mixed finite element methods for elasticity*

\*presented by co-author Rebecca Durst