

Darsim Lecture Series – 30/September/2019 – 12:30-13:30 – Room F



Ivan Yotov is Professor in the Department of Mathematics at University of Pittsburgh. He served as Department Chair between 2007-2017. His research interests are in numerical analysis of PDEs and large scale scientific computing with applications to flow in porous media, computational fluid dynamics, etc. His recent work spans multiscale modeling of multiphysics systems of coupled flow and mechanics, advanced discretization methods, stochastic modeling, uncertainty quantification, etc. Professor Yotov obtained his Ph.D. in Computational and Applied Math. from Rice University in 1996. He held a postdoctoral position at The University of Texas at Austin before joining University of Pittsburgh in 1998. He is an author of more than 90 scientific papers and is Editor in Chief of Computational Geosciences, Associate Editor of SIAM Journal on Numerical Analysis, and many more.

Stokes-Biot Modeling of Flow in Fractured Poroelastic Media

We study mathematical models and their finite element approximations for solving the coupled problem arising in the interaction between fluid in a poroelastic material and fluid in a fracture. The fluid flow in the fracture is governed by the Stokes/Brinkman equations, while the poroelastic material is modeled using the Biot system. We present several approaches to impose the continuity of normal flux, including an interior penalty method and a Lagrange multiplier method. A dimensionally reduced fracture model based on averaging the equations over the cross-sections will also be presented. Stability, accuracy, and robustness of the methods will be discussed.

