



Mathematical Sciences Fall 2023 Colloquium Series



Dr. Son-Young Yi

The University of Texas at El Paso



Friday, September 22 at 3:00pm
Bell Hall 130 and online via Zoom

Click on this announcement to access the Zoom link

Physics-preserving numerical method for modeling geothermal energy systems

Abstract

Geothermal energy is the thermal energy that comes from the sub-surface of the earth, and it is a sustainable alternative to fossil fuels that cause climate change. In this talk, I will discuss a numerical framework for modeling the thermo-hydro-mechanical (THM) processes involved in geothermal energy systems. One widely accepted mathematical model to describe the coupled THM processes is Biot's thermo-poroelasticity model based on irreversible thermodynamics. I will propose a coupled enriched Galerkin (EG) method, which utilizes two kinds of EG methods to provide a robust and physics-preserving scheme to solve the governing thermos-poroelasticity model. The proposed EG scheme is mass and energy conservative and free of numerical instabilities, commonly present in poroelasticity and coupled flow-transport problems. I will present theoretical aspects of the proposed EG scheme, including the mass and energy conservation properties and optimal convergence. I will also provide some numerical examples to confirm my theoretical results and demonstrate the great potential for the method to be used in more realistic scenarios. This is joint work with Dr. Sanghyun Lee from Florida State University.

For further information, please contact Dr. Emil Schwab, eschwab@utep.edu

