

**COLLOQUIUM**  
**UNIVERSITY OF PITTSBURGH**  
**FRIDAY APRIL 10, 2009**  
**704 THACKERAY HALL**  
**4:00 P.M.**

**PROFESSOR MARY F. WHEELER**  
**CENTER FOR SUBSURFACE MODELING,**  
**INST. FOR COMPUTATIONAL ENGINEERING & SCIENCES**  
**UNIVERSITY OF TEXAS AT AUSTIN**  
**COMPUTATIONAL ENVIRONMENTS FOR COUPLING MULTIPHASE FLOW,**  
**TRANSPORT & MECHANICS IN POROUS MEDIA**

**ABSTRACT:** Cost-effective management of remediation of contamination sites and carbon sequestration in deep saline aquifers is driving development of a new generation of subsurface simulators. The central challenge is to minimize costs of cleanup and/or maximize economic benefit from an environment whose properties are only poorly known and in which a variety of complex chemical and physical phenomena take place. In order to address this challenge a robust reservoir simulator comprised of coupled programs that together account for multicomponent, multiscale, multiphase flow and transport through porous media and through wells and that incorporate uncertainty and include robust solvers is required. The coupled programs must be able to treat different physical processes occurring simultaneously in different parts of the domain, and for computational accuracy and efficiency, should also accommodate multiple numerical schemes. In addition, this problem solving environment or framework must have parameter estimation and optimal control capabilities. We present a “wish list” for simulator capabilities as well as describe the methodology employed in the IPARS software being developed at The University of Texas at Austin. This work also involves a close cooperation on algorithm development with Prof. Ivan Yotov at the University of Pittsburgh.

**Refreshments served at 3:30 p.m.**  
**in the Math Dept. COMMON ROOM, Thackeray 705**