1077-65-1770   **Yalchin Efendiev**, **Juan Galvis** and **Seul ki Kang*** (`kang@math.tamu.edu`), Department of Mathematics, TAMU, College Station, TX 77843, and **Raytcho Lazarov**. *Multiscale simulations for Richards' equation in high-contrast media and applications.*

In this talk, I will describe multiscale simulation techniques for Richards' equation and applications. I will give a brief overview of coarse-grid approximation techniques that employ local spectral basis functions. Furthermore, I will discuss how these coarse spaces can be used in developing iterative methods that converge independent of the contrast. The iterative techniques that will be discussed will consist of both inner and outer iterations. We will show that both inner and outer iterations do not depend on the contrast of the media. Furthermore, I will discuss coarse-grid approximation and show that one can achieve accurate approximation by including spectral basis functions. I will mention applications of these problems in soil moisture predictions and uncertainty quantification. This work is joint with Y. Efendiev, Galvis, and Lazarov. (Received September 20, 2011)