The Canterbury Branch of the Royal Society of New Zealand, Aqualinc and the Waterways Centre for Freshwater Management present ***The 2017 Darcy Lecture***

A Tale of Two Porosities: Exploring Why Contaminant Transport Doesn't Always Behave the Way It Should

Presented by **Kamini Singha, Ph.D**.

Wednesday, August 30, 2017
5:30 pm nibbles, tea/coffee
6:30- 7:30 pm Presentation
C3 Lecture Theatre
University of Canterbury
Christchurch

All are welcome, no RSVP required.

In hydrology, the ability to quantify subsurface transport is an issue of paramount importance due to problems associated with groundwater contamination. Observational challenges and complexity of hydrogeological systems lead to severe prediction challenges with standard measurement techniques. One important example of a prediction challenge is "anomalous" solute-transport behavior, defined by characteristics such as concentration rebound, long breakthrough tailing, and poor pump-and-treat efficiency. Such phenomena are observed but not predicted by classical theory. Numerous conceptual models have been developed to explain anomalous transport, such as the presence of two distinct populations of pores — one where solutes are highly mobile and another where they are not — but verification and inference of controlling parameters in these models *in situ* remains problematic, and therefore often estimated based on data fitting alone. Recent tests using simple electric geophysical methods directly measure the process of mobile-immobile mass transfer and allow estimation of parameters controlling anomalous transport.

This lecture presents a rock-physics framework, an experimental methodology, and analytical expressions that can be used to determine parameters controlling anomalous solute transport behavior from colocated hydrologic and electrical geophysical measurements in a series of settings, including groundwater and surface water/groundwater systems. The long-term goals of this work are to contribute toward improving the predictive capabilities of numerical models and enhancing the fidelity of long-term groundwater monitoring frameworks.

Kamini Singha, Ph.D., is a professor in the Department of Geology and Geological Engineering and the associate director of the Hydrologic Science and Engineering Program at the Colorado School of Mines. She worked at the U.S. Geological Survey Branch of Geophysics from 1997 to 2000, and was a member of the faculty at The Pennsylvania State University from 2005 to 2012. She earned her B.S. in geophysics from the University of Connecticut in 1999 and her Ph.D. in hydrogeology from Stanford University in 2005.

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