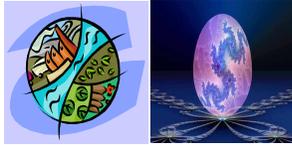


Special Colloquium Series, Spring & Fall 2005:

Between Nature and Science:

Advanced Modeling Concepts for Environmental Sciences



Muhammad Sahimi
Professor & Chairman
Department of Chemical Engineering
University of Southern California



**The Effect of Connectivity of Microscopic Elements of Disordered Systems
on Their Macroscopic Properties: Introduction to Percolation Theory**

Thursday April 14th

4:00-5:00pm

PES 3001

Light refreshments provided

If the streets of Los Angeles are randomly closed (which is often seemingly the case), what is the minimum number of streets that must be open in order for a driver to start from the Pacific Ocean on the Westside and reach the USC medical school on the Eastside? In these times of high oil and gasoline prices, if we inject water into an oil reservoir in order to increase oil production, how should the water front advance in the reservoir in order to produce more oil? If a composite material is composed of conducting and nonconducting elements, what is the minimum volume fraction of the conducting elements in order for the composite as a whole to be conducting? If monomers are reacting in a reaction bath to form a large molecule, what is the minimum fraction of reacted monomers in order for the molecule to become rigid and behave like a solid material? How does people knowing each other and talking to one another affect their voting patterns?

These and similar questions can be answered by using percolation theory which quantifies the effect of the connectivity of the microscopic elements (streets, pores that are filled with water, conducting elements, monomers, people, ...) of disordered systems (Los Angeles, an oil reservoirs, society, ...) on their Macroscopic properties (flow of traffic, flow of oil, flow of electric current, ...). In this seminar, the essential elements of percolation theory are described in simple terms and their applications to the above and several other important problems in science and technology are discussed.

Muhammad Sahimi is Professor and Chairman of Chemical Engineering at the University of Southern California in Los Angeles. He obtained his BS from the University of Tehran (Iran) in 1977 and his Ph.D. from the University of Minnesota in Minneapolis in 1984, both in chemical engineering. He has been a faculty member at USC since 1984. He has also been a visiting professor in Australia, Europe, the US, and the Middle East, and a consultant to many industrial corporations. He has published over 220 papers in peer-reviewed journals and four books. Among his honours are the Alexander von Humboldt Foundation Research Award and the United Nations UNESCO Khwarizmi Award for distinguished achievements in science.

Upcoming Speakers:

21-Apr	Alan Hastings	"Transient Dynamics: The Key to Ecological Understanding"
28-Apr	Vit Klemes	"Some Thoughts About Stochastic Hydrologic Modeling Inspired by the Canadian Wilderness"
12-May	Constantino Tsallis	"Nonextensive Statistical Mechanics - Introduction and Applications"
19-May	John Rundle	TBA
2-Jun	Jim Crutchfield	"Multiagent Dynamical Systems"

Sponsored By: John Muir Institute for the Environment, Computational Science and Engineering Center, Department of Civil and Environmental Engineering, Department of Land, Air, and Water Resources, Department of Chemical Engineering and Materials Science, Soil Sciences, Atmospheric Sciences, and Hydrologic Sciences Graduate Groups, College of Agriculture and Environmental Sciences, U.C. Cooperative Extension