COLLOQUIUM

DEPARTMENT OF MATHEMATICS AND STATISTICS
OAKLAND UNIVERSITY
ROCHESTER, MICHIGAN 48309

Anna Spagnuolo
Department of Mathematics and Statistics
Oakland University
Rochester, Michigan

A model for nuclear contaminant transport in porous media and a Locally-Conservative Eulerian-Lagrangian Method (*LCELM*)

Abstract

It is proposed that nuclear waste be placed in steel containers, then clad in concrete, and finally buried in granite rock formations. Before a final decision is made regarding a location site, it is crucial that simulations be performed. Of particular concern is predicting where and how far the contaminant(s) could travel should leakage from containment occur. Some of the complications are due to the time-scale involved in answering such questions. The half-lives of the nuclear elements are on the order of hundreds of thousands of years, and fractures could develop over that time period. Moreover, the species decay into other potentially harmful species. Therefore, it is necessary to track of all of the elements in the nuclear decay chain. I will present a model that describes such flow in groundwater and a new numerical method, namely a *Locally-Conservative Eulerian-Lagrangian Method (LCELM)*, for approximating the flow. I will also show several numerical simulation results that were performed using the *LCELM*.

372 Science and Engineering Building
Thursday, November 15th, 2001
3:00 to 4:00 P.M.
(Refreshment at 2:30 to 3:00 P.M. in Room 368,
Science and Engineering Building)

About the speaker

A newly appointed Assistant Professor in the Department of Mathematics and Statistics at Oakland University, Dr. Anna Spagnuolo received her B.S. and M.A. in Mathematics at Oakland University in 1991 and 1993, respectively. She then moved to West Lafayette, Indiana to attend Purdue University in pursuit of a Ph.D. in Mathematics. Although she has always enjoyed learning many fields in mathematics, she decided to focus her attention on applications. Under the guidance of Professor Jim Douglas, Jr., she received her Ph.D. degree in Applied Mathematics with an emphasis on fluid flow in porous media in 1998. One year before finishing her Ph.D. work, she accepted an invitation to work at Exxon Production Research Company in Houston, Texas for one summer. There she worked on (and solved) problems and answered questions involving gas, oil, and water flows in naturally-fractured reservoirs. She also worked on MARS (a Multiple Applications Reservoir Simulator) while at Exxon.

She then spent the next two years (1998 - 2000) at Texas A&M University as a Visiting Assistant Professor in both the Mathematics Department and the Institute for Scientific Computation, where she enjoyed teaching as well as continuing her research program. She is very interested in applied mathematics problems in general. Besides porous media flow problems, she is also working with specialists in the medical sciences on problems such as the mathematical modeling and tracking of *Vibrio cholerae*, a pathogenic bacterium.