SPECIAL PHYSICAL MATHEMATICS SEMINAR

TOPIC: ASYMPTOTIC ANALYSIS OF FLOW IN REACTIVE POROUS MEDIA AND MOTION OF A SPHERE CLOSE TO A BOUNDARY

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ABSTRACT:

My talk will cover two different types of problem in fluid dynamics. First, I will present analysis of flow in a reactive porous medium when compositional buoyancy drives convection during solidification of a binary fluid. I find similarity solutions to the coupled nonlinear partialdifferential equations that characterize the solute concentration, temperature, solid fraction and the flow field, which yield predictions of the shape of free boundaries and of mass, solute and heat transport in the system.

Second, I will discuss the motion of a heavy sphere close to a boundary. In order to quantify the velocity and rotation rate of the sphere, it is necessary to understand the force and torque balance on the sphere. I will consider how a thin liquid film that coats the boundary affects the motion of the sphere, and what physical processes give rise to a force normal to the boundary on the sphere. Future work will also be outlined.

DATE: FRIDAY, FEBRUARY 6, 2004

TIME: 2:30 PM

LOCATION: Building 2, Room 338

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