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APPLIED MATHEMATICS SEMINAR 291

The Reference Map Technique for Simulating Complex Materials and Multi-body Interactions

Date: **4/6/18**
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Location: **COB 267**

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ABSTRACT

Conventional computational methods often create a dilemma for fluid-structure interaction problems. Typically, solids are simulated using a Lagrangian approach with grid that moves with the material, whereas fluids are simulated using an Eulerian approach with a fixed spatial grid, requiring some type of interfacial coupling between the two different perspectives. Here, a fully Eulerian method for simulating structures immersed in a fluid will be presented. By introducing a reference map variable to model finite-deformation constitutive relations in the structures on the same grid as the fluid, the interfacial coupling problem is highly simplified. The method is particularly well suited for simulating soft, highly-deformable materials and many-body contact problems, and several examples will be presented. This is joint work with Ken Kamrin (MIT).

BIO:

Chris Rycroft is an associate professor of applied mathematics in the Harvard John A. Paulson School of Engineering and Applied Sciences. He is interested in mathematical modeling and scientific computation for interdisciplinary applications in science and engineering. Prior to his appointment at Harvard, Rycroft was a Morrey Assistant Professor in the Department of Mathematics at the University of California, Berkeley. While in Berkeley, he was part of the Bay Area Physical Sciences-Oncology Center, where he investigated how cancer cells mechanically interact with each other and their environment. Rycroft is a visiting faculty scientist at the Lawrence Berkeley Laboratory, where he has worked on several projects relating to energy production and efficiency. He obtained his Ph.D. in Mathematics in 2007 from the Massachusetts Institute of Technology.