Applied Mathematics Seminar
INSCC 110, 3:30pm Monday
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Membrane Simulations

by

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Abstract

Fluid-membrane systems are common and include parachutes, vehicle airbags, inflatable strcutures, blood vessels and biological cells. These systems are difficult to model numerically when the membrane deforms substantially and has an effect on the fluid flow. Extension of the material-point method (MPM) to problems of this type will be presented. The extensions include the represention of membranes with a set of unconnected points on a surface, the constitutive model and the construction of surface normals. The resulting method combines benefits of interface tracking and interface capturing techniques. Recent work on coupling MPM with nonequilibrium molecular dynamics (NEMD) to model lipid bilayers in biological cell membranes will also be discussed.