



McGill Computational Science and Engineering Seminar



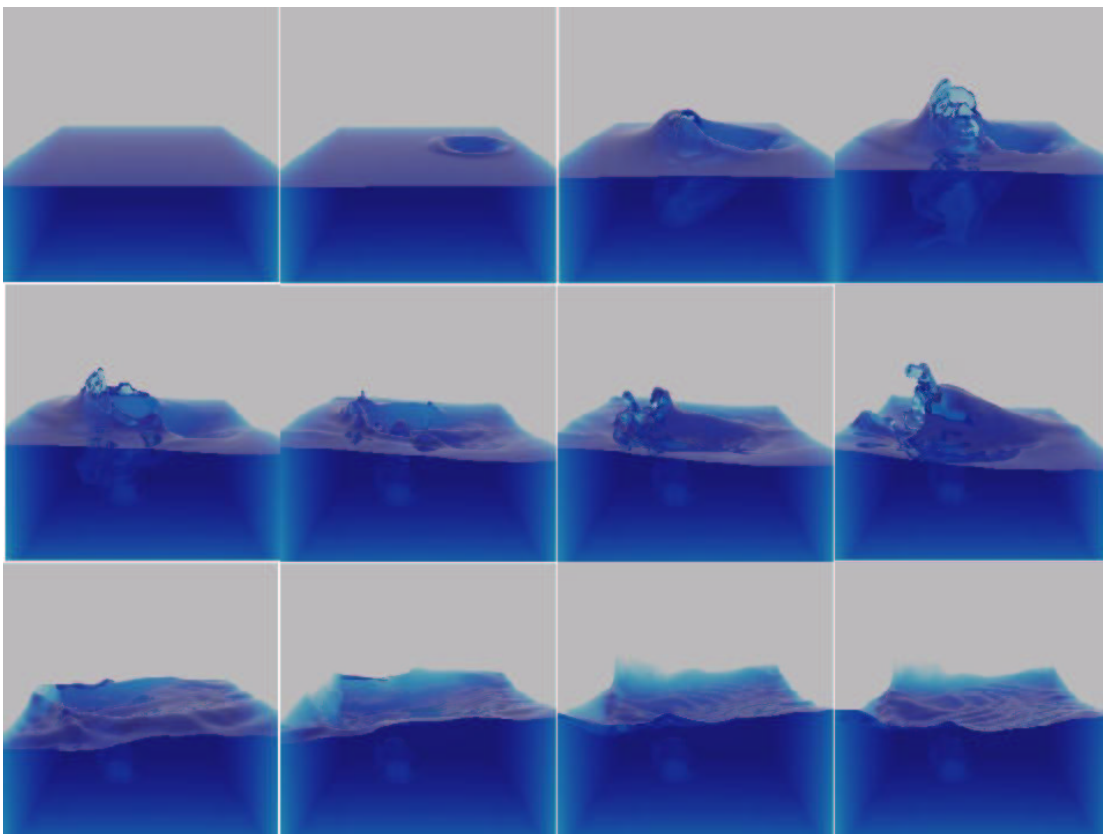
Friday October 4 at 14:30 in Burnside Hall 934

Matrix-Free Multigrid Approach to 3D Stefan Problems

Justin W.L. Wan

Department of Computer Science, University of Waterloo

In computer simulations such as epitaxial thin film growth using the island dynamics model, or water animation using the two-phase incompressible Navier-Stokes model, one needs to solve Poisson equations with many complex interfaces, which are often known as Stefan problems. Moreover, the PDE coefficients often have large jumps in discontinuities. The large number and highly irregular shape of the interface pose great challenge to accurate and efficient numerical solution to the problems. In this talk, we present a fast multigrid preconditioning technique for solving highly irregular interface problems. Our approach takes advantage of the knowledge of the interface location and the jump conditions, which one often knows in practice. Specifically, our interpolation captures the boundary conditions at the interface. Numerical results in 2D and 3D show that the resulting multigrid method is more efficient than other robust multigrid methods, and is independent of both the mesh size and the size of the jump.



Coffee and desserts are served after the seminar.