

# BI-CO MATHEMATICS COLLOQUIUM

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*“Modeling and Simulation of Water Waves”*

**Monday, November 16, 2009**

Talk at **3:15 – KINSC H011\***

Tea at **3:00 – KINSC Math Lounge, H208**

**Abstract:** I will start with an introduction to the study of water waves to expose some reasons why this subject is of interest in mathematics and engineering. I will then present a mathematical formulation for water waves based on potential flow theory and having a Hamiltonian structure. By introducing the so-called Dirichlet-Neumann operator, which gives the normal fluid velocity at the free surface, the governing partial differential equations can be reduced to a lower-dimensional system involving surface quantities alone. This formulation is suitable for both mathematical analysis and direct numerical simulations. In particular, the Dirichlet-Neumann can be written as a Taylor series expansion in powers of the surface elevation. I will describe an efficient and accurate numerical method to solve the equations in this formulation, and finally I will show some numerical applications.

*\* Please note the special time and place for this colloquium in order to allow attendance at the 4:30 Physics talk.*

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