Frontiers of Scientific Computing Lecture Series

## Modeling, Analysis and Computation of Biomembranes

**Ricardo Nochetto, University of Maryland**

Johnston Hall 338
February 02, 2012 - 03:30 pm

**Abstract:**
We present three models of biomembranes along with their numerical simulation. The first one is purely geometric since the equilibrium shapes are the minimizers of the Willmore (or bending) energy under area and volume constraints. The second model incorporates the effect of the inside (bulk) viscous incompressible fluid and leads to more physical dynamics. The third model describes the interaction of a director field with a membrane, giving rise to an induced spontaneous curvature. We propose a parametric finite element method for the discretization of these models and examine crucial numerical issues such as dealing with curvature and length constraints within a variational framework. We show several simulations describing the dynamics of purely geometric flows, membrane-fluid interaction, and the dramatic effect of defects of the director field on membrane shape. This work is joint with S. Bartels, A. Bonito, G. Dolzmann, M.S. Pauletti, and A. Raisch.

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**Speaker's Bio:**
Ricardo Nochetto received his MS in Mathematics and Electrical Engineering from the Universidad de Rosario in Argentina. He received his Ph.D. in Mathematics from the Universidad de Buenos Aires in Argentina. He joined the University of Maryland, College Park, Mathematics Department as an Assistant Professor in 1987, and became Full Professor in 1994. Recently, he was an invited speaker at ICM 2010, and was named SIAM Fellow in 2011. His research interests are free boundary problems and phase transitions: finite element methods, adaptivity, and related PDE issues.

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**Refreshments will be served.**
**This lecture has a reception.**



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