Frontiers of Scientific Computing Lecture Series

Interaction of Elastic Biological Structures with Complex Fluids

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Johnston Hall 338
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Abstract:
The biofluid dynamics of reproduction provide wonderful examples of fluid-structure interactions. Peristaltic pumping by wave-like muscular contractions is a fundamental mechanism for ovum transport in the oviduct and uterus. While peristaltic pumping of a Newtonian fluid is well understood, in many important applications the fluids have non-Newtonian responses. Similarly, mammalian spermatozoa encounter complex, non-Newtonian fluid environments as they make their way through the female reproductive tract. The beat form realized by the flagellum varies tremendously along this journey. We will present recent progress on the development of computational models of pumping and swimming in a complex fluid. An immersed boundary framework is used, with the complex fluid represented either by a continuum Oldroyd-B model, or a Newtonian fluid overlaid with discrete viscoelastic elements.

Speaker's Bio:
Lisa Fauci has been a Professor of Mathematics at Tulane University since 1998. She is also an Associate Director of the Center for Computational Science at Tulane and Xavier Universities. A member of the SIAM Council, she is also the Associate Editor of the SIAM Journal of Scientific Computing.

Refreshments will be served.
This lecture has a reception.

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