Undergraduate Colloquium April 7, 4pm, PGH646

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Interactions between fluids and structures motivated by real-life problems: micro-swimmers, vascular stents, and heart valves

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Real-life problems have always been driving the development of new mathematics. With the recent developments of new technologies, biomedical engineering and medicine, the need for new mathematical and numerical methodologies to aid these developments has never been greater. Real-life problems are usually mathematically rich and very complex. Certain simplifications always have to be taken into account to obtain a mathematically tracktable problem that captures the leading-order physics or physiology well. In this talk I will focus on problems motivated by



Stent in artery

biomedical applications that have for the past 25 years been driving the development of mathematical theory and design of numerical methods in partial differential equations modeling the interaction between incompressible, viscous fluids such as blood, and structures, such as cardiovascular tissue, vascular prostheses called stents, or micro-swimmers used in drug delivery. A survey of mathematical problems in this area will be given, and examples of applications will be presented. This research was produced through an interdisciplinary collaboration between mathematicians (M. Bukac (Notre Dame), A. Quaini (UH), R. Glowinski (UH), T.W. Pan (UH), J. Tambaca (Zagreb), B. Muha (Zagreb), D. Forti (EPFL), Y. Wang (UH), L. She (UH), S. Basting (Erlangen)) and cardiovascular specialists from the Texas Medical Center in Houston (Dr. S. Little (Methodist Hospital Houston), Dr. W. Zoghbi (Methodist Hospital), Dr. D. Paniagua (Texas Heart Insitute), C. Hartley, PhD (Baylor College of Medicine)).

Pizza and refreshments will be served