Aerospace and Mechanical Engineering Seminar

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Fluid-Structure Interaction of Plates and Shells in Axial Flow

Thin-walled structures in contact with axial flowing fluid can be found in many engineering and biomechanical systems. Their dynamics are inevitably influenced by flow-induced inertia and forces, and because of their thin nature, vibrations represent a major problem. When subjected to flow-induced vibrations, structures can undergo large displacements and instabilities (i.e., divergence or flutter). These phenomena must be analyzed using nonlinear elasticity in order to accurately describe the structural dynamic behavior and to prevent failure. This talk will focus on Tubaldi's recent work on stability and vibration of: (i) plates with geometric imperfections in axial flow, (ii) pressurized orthotropic shells conveying pulsatile flow with wave propagation phenomenon and (iii) human aortic prosthesis conveying blood flow. In the nonlinear regime for certain frequency ranges, interesting dynamics (i.e., quasiperiodic and chaotic responses) of shells containing flowing fluid is displayed. A relevant application to the field of cardiovascular mechanics and surgery, such as the dynamic response of Dacron vascular grafts to physiological pulsatile flow, will be presented.

Bio

Eleanora Tubaldi received a BS in aerospace engineering in 2010 from Politecnico di Milano (Italy) and a double MS in aeronautical and aerospace engineering in 2013 from Politecnico di Milano (Italy) and École Polytechnique de Montréal (Canada). Tubaldi is a PhD candidate in the Department of Mechanical Engineering at McGill University (Canada), scheduled for graduation in spring 2017.

Tubaldi is the author of several peer-reviewed international journal papers. She is also a reviewer for the Journal of Fluids and Structures, the International Journal of Nonlinear Mechanics, Computers in Biology and Medicine, and Coupled Systems Mechanics. She has been awarded national scholarships, including the Doctoral Research Quebec Merit Scholarship for Foreign Students, or PBEEE, and Mechanical Engineering Doctoral Award, or MEDA, at McGill University.

AME Lecture Hall, Room S212
Tuesday, April 18, 2017
4 p.m.
Refreshments and socializing 3:45 p.m. at the east end of the AME Courtyard