Department of Mathematical Sciences Colloquium

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Mathematical modeling of fluid-structure interaction problems

The interaction of aerodynamic and aeroelastic fields is a highly nonlinear process which plays an important role, e.g., in the design of aerospace vehicles and analysis of their aeroelastic stability. In this study we are interested in the interaction of two-dimensional incompressible viscous laminar flow with a solid airfoil which can rotate and oscillate vertically. The numerical simulation of such a problem is challenging from several points of view. First, suitable numerical discretization and stabilization of the Navier-Stokes equations for high Reynolds numbers needs to be performed. Next, suitable mathematical model of the coupling mechanism between the Navier-Stokes equations and the elastic structure needs to be developed. The motion of the elastic structure results in time-dependent deformations of the computational domain for the fluid, which can be treated, e.g., via the Arbitrary Lagrangian-Eulerian method. We will discuss weak and strong coupling mechanisms based on both the laminar and Reynolds Averaged Navier-Stokes equations equipped with a suitable turbulence model.

Friday, February 3, 2006, at 3 pm in Bell Hall 143
The University of Texas at El Paso

Refreshments will be served in front of the colloquium room 15 minutes before the start of the colloquium.

For further information, please contact Dr. Pavel Šolín, Bell Hall 220. Phone: (915) 747-6770, email: `solin@utep.edu`.