CCSU
DEPARTMENT OF MATHEMATICAL SCIENCES

COLLOQUIUM

Friday, October 11
3:00 – 4:00 PM
Maria Sanford, Room 101

ROTARY WING AERODYNAMIC MODEL IN FLIGHT

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Abstract: Rotary wing aerodynamics is an interesting topic for researchers, design engineers and students to study. This is due to rotating blades constantly operate under very complicated dynamic and aerodynamic environments. In order to generate enough lift to fly the helicopter, rotor blades also need to provide propulsive forces to achieve the desired speeds, and at the same time to be correctly responding to rotor control inputs with proper phasing. Therefore, good and accurate mathematical models in helicopter rotor design become more important and challenging. In vertical flights, all rotor blades operate under the same flight conditions, the airspeeds only vary along the blade radius. However, in forward flights, the aerodynamics of each blade is quite different. The blades encounter higher airspeeds on the advancing side of the blades and lower airspeeds on the retreating side. In order to achieve a balanced lift in flight, additional pilot control is needed to vary along the blade azimuth. This situation becomes more critical when higher speeds and larger flight envelops are needed. The blade flapping motion using a new induced velocity model is developed by Prof. Perdomo of Math Department. We will prove that the induced velocity in forward flight has only one solution even the governing equation is quartic.

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