



**RSVP**

**SPEAKER**

**Xiaolin Li**

*Professor*

Dept. of Applied Math & Statistics  
Stony Brook University



## **Modeling and Simulation of Parachute Inflation on Front Tracking Platform with the Dual-Stress Spring-Mass Fabric Model**



**Friday, April 25th**  
**12pm - 1pm**



**Location**  
**C107**

### **Abstract**

This work presents a story of mathematical modeling through the development of a mesoscale dual-stress spring model, derived using Rayleigh-Ritz analysis, to represent the fabric surface of a parachute as an elastic membrane. The elastic structure is coupled with a fluid solver via the impulse method to capture fluid-structure interactions.

We describe the implementation of this coupled system on a front-tracking computational platform, leveraging its data structures and core functionalities. Key challenges in this multi-physics simulation are addressed, including turbulence modeling, fabric collision, parachutist-body-fluid interaction, and computational parallelization.

We also provide numerical evidence of convergence, along with verification and validation of the model components.

Finally, we discuss the software architecture designed to support simulations of various air-delivery systems.