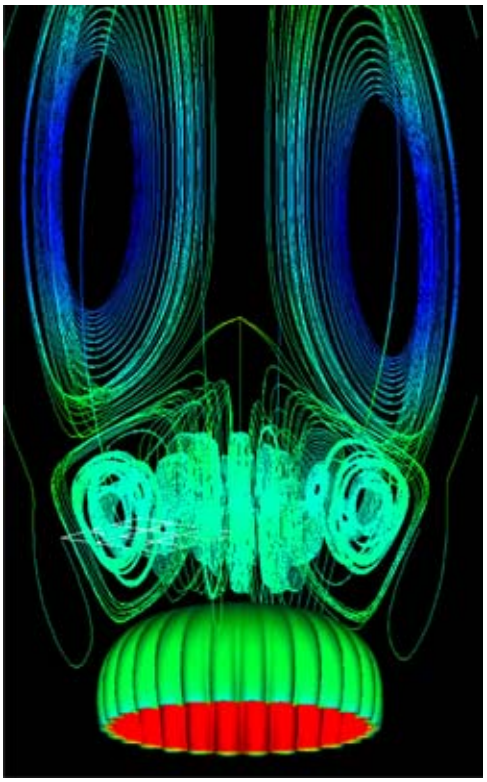
Parachute Modeling and Simulation

What It Is:

How does a parachute inflate? The aerodynamic forces that make it happen are extremely complicated. We've developed a computer model that can simulate both the canopy's shape and the pressures on its surface.

Why It's Needed:

Parachutes are a vital technology for getting warfighters and ammunition to the battlefield. Another escalating demand is airdropping food, medical supplies, and shelters as part of humanitarian relief efforts. Traditionally, these parachutes and airdrop systems have been developed through full-scale testing — an approach that consumes both time and money. Computer models and simulations let us test new parachutes — more quickly and cheaply — in a virtual proving ground.



How It Works:

How do we capture the complex physics of an opening parachute? We need to look at the interaction of two phenomena:

Fluid Dynamics…The airflow in and around the canopy determines the pressure on the canopy's surface.

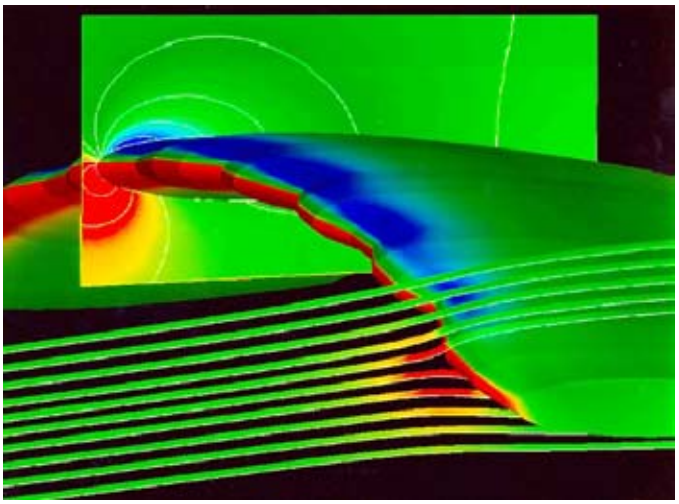
Structural Dynamics…This refers to the solid parts of the system: the fabric of the canopy, the suspension lines, and the load the parachute carries.

Our model links software that predicts fluid dynamics with software that predicts structural dynamics. High-performance computing lets us make intricate 3-D simulations of the parachute. We're now running wind tunnel tests to validate our software.

Benefits:

Cutting Costs…We're eliminating the need for costly cut-and-try experiments.

Finding Answers…Our 3-D model has the potential to solve many problems of interest to the Army — like how round canopies open and how parachutes respond to wind.



Point of Contact:

Airdrop/Aerial Delivery Liaison
COMM: (508) 233-4495

NATICK SOLDIER CENTER
Kansas St.
Natick, MA
01760
nsc.natick.army.mil

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