

Optimization of Nonlinear, Coupled Fluid-Thermal Systems

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Microgravity Flow

- **Space Applications**
 - **Crystal Growth**
 - **Biomedical Experiments**
 - **Combustion Science**
- **Earth Applications**
 - **Thin Film Flows**
 - **Semiconductor Manufacturing**

MGFLO: MicroGravity FLOW Simulator Developed
in the Aerospace Department

Previous Work

- Investigated Operation of the MGFL0 Code
- Designed Simple Optimization Routine in MatLab
- Established Algorithms to Optimize Complex Fluid-Thermal Systems

Current/Ongoing Work

- Implement Software Optimization and Control For MGFL0
- Control Fluid-Thermal System Through Boundary Condition Manipulation
- Research Current Microgravity Flow Applications

Code Details

- Developed Under NASA-Grand Challenge Support
- Parallel Finite Element Formulation of Navier-Stokes and Energy Equations
- Allows for Coupled and Uncoupled Solution
- We Will be Optimized Through MatLab Using Existing Algorithms

Group Organization

- **Benjamin Kirk: Group Lead**
 - Research Optimization Techniques
 - Develop & Debug Software
 - Analyze Results
- **Carrie Keyworth: Principal Investigator**
 - Research Microgravity Flow Applications
 - Test & Verify Software
 - Analyze Results