Microgravity Fluids for Biology Workshop

ASGSR Workshop III

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Introduction

• Last year (at first ASGSR meeting) we kicked off/brainstormed ideas to foster collaboration between Fluid Physics and Space Biology.

• Developed a draft White Paper – organized to identify fluids-related knowledge/technical gaps currently facing space biology research.

• Will present overview today and invite the broader community to comment/respond.

• This is not a new concept - our goal is to reenergize both disciplines – challenge them to work together within their current budget/program limitations as well as advocate for new work if warranted.

• Fits into Open Source approach.
Multiscale Fluid-Structural-Interaction Physiological Models

Fluid- Structural Vestibular Model

Inner Ear  μG Caloric Stimulation Test  Rotational Chair Test

Integrated Multiscale Cardiovascular Model

Ultrasound Measurement of μG Cardiac Shape  FE Predicted Cardiac Shape Change in μG
CFD Coupled to Population Balance Model of Nephron as a Continuous Crystallizer

- Continuous Crystallizing Reactor
- Nucleation
- Growth
- Agglomeration
- Breakage

Physical Flow CV (Nephron)

Imaginary Growth CV

Normal-Microgravity

Stone Former-1G
Next Steps

• Incorporate comments & suggestions – by November 30th.
• Prioritize risks and finalize white paper – by early next year.
• Identify areas of collaboration and match skills – on going.

Provide to presenters today or email to:
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Please sign and provide email address
Presentations

- **Current and Future Issues for Plant Systems**
  Gioia Massa & Charles Quincy, NASA KSC

- **Microgravity Fluids Issues for Animal Systems**
  Jeffrey D. Smith, NASA ARC

- **Microgravity Fluids Issues for Cell Biology and Microbiology**
  Jeffrey D. Smith, NASA ARC

- **Microgravity Issues for Bioregenerative Life Support Technologies**
  Raymond M. Wheeler, NASA KSC