

NNX11CH36P- Free Surface Modeling of Cryogenic Fluids on Unstructured Grids

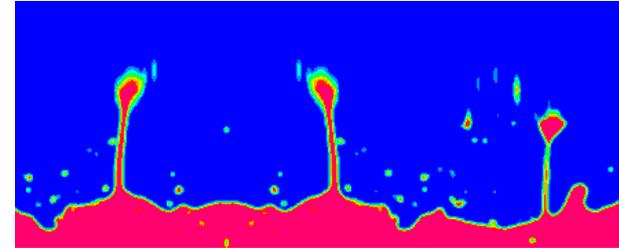
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Identification and Significance of Innovation

- VOF simulation capability has proved to be of significant value to NASA
- Current use is limited by restriction to structured mesh types and poor parallel scalability.
- Best opportunity to increase the value is to implement VOF in Loci/Stream
 - Most wide-spread dissemination within NASA
 - Best way to realize potential of parallel processing

Expected TRL Range at the end of Contract (1-9): 6



Predicted liquid surface behavior in LH2 tank under thrust oscillation conditions.

Technical Objectives and Work Plan

- Verify order of accuracy of interface reconstruction and interface advection of existing 2D VOF module.
- Integrate existing 2D VOF module with Loci/Stream.
- Incorporate surface tension forces in integrated Stream-VOF code.
- Verify integrated Stream-VOF solver by application to selected problems from:
 - Fluid sloshing
 - Stationary droplet
 - Oscillating droplet
 - Bubble rise in liquid.

NASA and Non-NASA Applications

- NASA
 - Cryogenic fluid slosh in launch vehicle tanks.
 - Assessment of thrust oscillation mitigation designs
 - Liquid rocket engine fuel injectors
- Non-NASA (selected from numerous uses):
 - Casting and other mold-filling
 - Naval design
 - Liquid break-up applications (e.g., spray atomization)
 - Micro-fluidic devices

Firm Contacts