

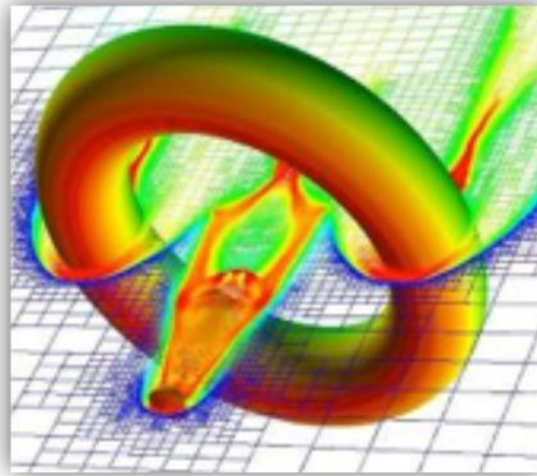
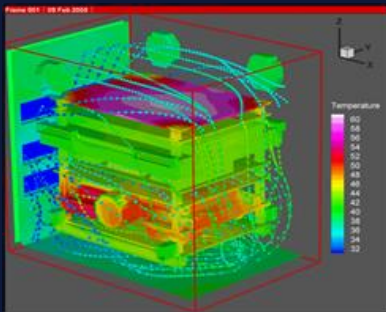
Dynamics Analysis & CFD Capabilities

Multi-Disciplined Engineering: Dynamics Analysis & CFD Capabilities

ZIN offers multi-disciplinary engineering services and flight hardware completion capability with small business flexibility and cost. ZIN's mission is to provide innovative solutions and products through advanced technology, superior engineering and management excellence.

TOOLS:

- NASTRAN-GT
- DAC
- Ball-DAC
- DACFREE
- SINDA-FLUINT
- LS-DYNA
- OpenFOAM
- Gridgen
- Solidworks
- Paraview
- Matlab

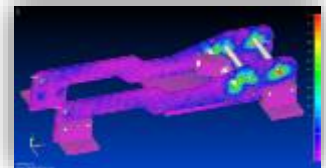


The specialized engineering team with a dedicated skill set works collaboratively to analyze and solve complex fluid flow problems. We have expertise in high speed flows in the continuum, transitional, and rarefied flight regimes and in thruster plume contamination analysis. Our high-speed flow capabilities include chemically reacting flows and coupling these flows to highly non-linear structures.

Additional expertise includes aerodynamic database creation for dynamics simulations. Analysis capabilities include wind tunnel validation and large eddy simulation (LES) to model aeroacoustic phenomena driven by unsteady cavity flow unique to launch vehicle ascent environments.

ZIN is comprised of experts that are culturally systems level thinkers, understanding the interplay of the aerodynamics and particle motions with other instrument and spacecraft subsystems. As a result, we are able to facilitate predictable and successful support of conceptual design, studies, proposals, R&D, flight programs, and on-orbit diagnostics.

- ZIN experience includes computational, analytical, and experimental fluid and thermal systems simulation, including Computational Fluid Dynamics (CFD) and computational heat transfer (CHT).
- ZIN has conducted computational plume impingement and free molecular heating analysis, computational and analytical propellant slosh analysis, thermodynamic cycle analysis, multiphase flow and boiling and condensation heat transfer, heat transfer in phase-change solidification, microgravity fluid management, passive and active gas-liquid separation, LES turbulence modeling, and aeroacoustic predictions.
- CFD analysis is performed, when necessary, in space flight applications, it is frequently used to assess flow across a COTs PCB to ensure the flow is greater than it would experience with free convection in a 1g environment.



ZIN Technologies



Voyager Space External Use
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