

Classification - Unclassified

Modeling Dynamic Materials Experiments on Z

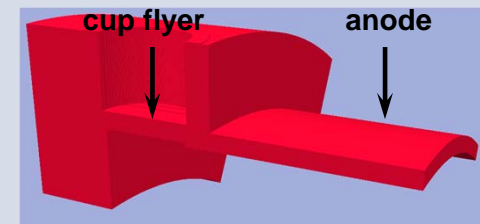
- ALEGRA 3D, MHD calculations enabled by dedicated time on Cielo advance understanding.
- Cylindrical experiments on Z revealed discrepancy in key velocity measurements used to determine current.
- ALEGRA, 3D, MHD (magnetohydrodynamic) simulation of measurement region performed on Cielo; ***explains discrepancy***.
 - Parameter studies on **8192-20480 cores** (3-7 clock days / run) reveal causes.
 - Magnetic field driving cup flyer not cylindrical after significant deformation; cannot be used as current diagnostic.
- 2D and 3D simulations (**256-20480 cores**) to assess integrity of plutonium (Pu) containment chamber in cylindrical and planar experiments on Z reveal dynamic state and location of Pu.
- PI: Ray Lemke; HEDP Physics Dept. 1641; Code: ALEGRA radiation magnetohydrodynamics; Total run time: 8 Cielo days.

ALEGRA 3D: Aluminum Anode & Cup Flyer Plate

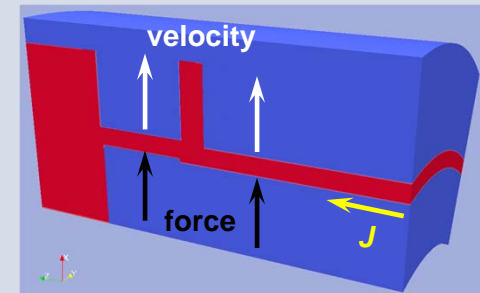
60° cylindrical wedge in half-symmetry; density solid aluminum shown.

Wedge including void; magnetic force (due to current J) pushes flyer & anode outward. Laser interferometry (VISAR) measures velocity.

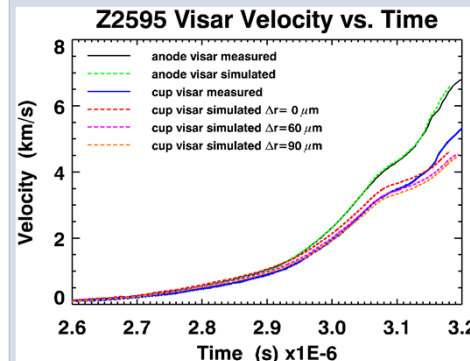
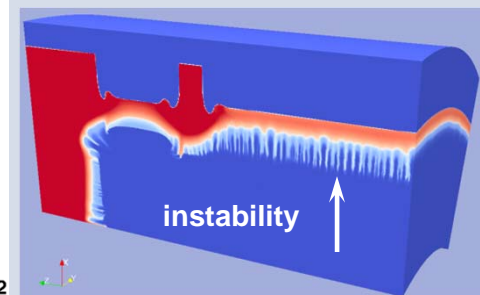
Anode & cup flyer plate velocities different due to 3D deformation of cup.



Initial Time (void=dark blue)



Final Time 3191 ns



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