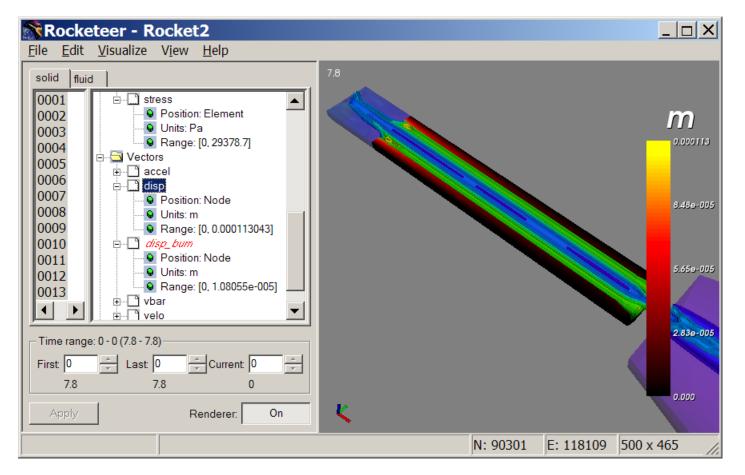
Section 12 Visualization

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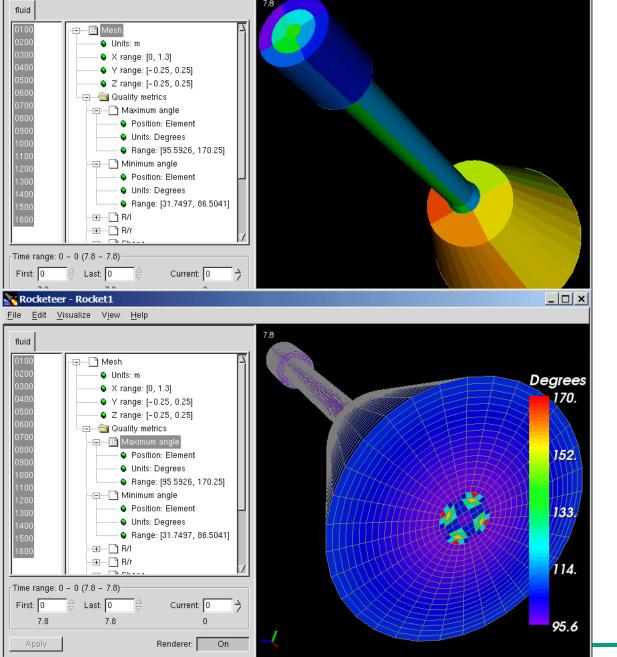


Visualization with Rocketeer

- Prerequsites on Linux
 - libstdc++.so.5 (compat rpm's)
 - libGLU.so.1 (rpm)







N: 81126

E: 76608

500 × 500

Rocketeer - Rocket1

File Edit Visualize View

Rocketeer

All data sets

_ 🗆 ×

- Times, Blocks
 - Coordinates/ranges
 - Nodes/elements
 - Variables/ranges
 - Scalars
 - Vectors
 - Tensors
- Mesh
 - Blocks by color
- Quality metrics
 - Min/Max angle
 - Size, Skewness, etc.
- Surface plots



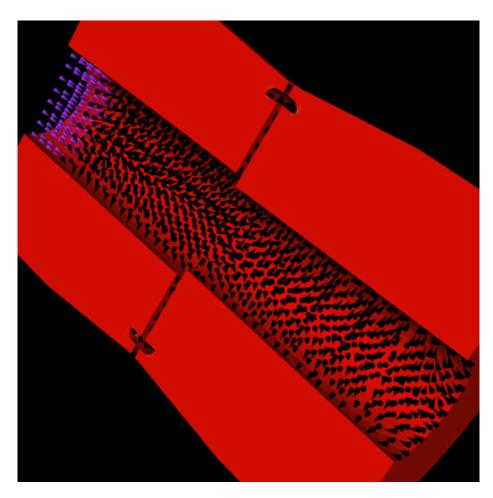
Rocketeer - Rocket1 Edit Visualize View Help ifluid_b ifluid_nb 0100 ⊕... Mesh ⊕ Scalars 0200 m/s 🖶 🔁 Vectors 0300 ± □ rhovf 0400 - 1 vf 0500 Position: Element 0600 Units: m/s 0700 Range: [0.411796, 2356.44] l0800 1.50e+00. 10900 1000 1100 1200 1.00e+003 1300 Time range: 0 - 0 (7.8 - 7.8) Last: 0 First 0 Current 0 7.8 7.8 Rocketeer - Rocket1 Edit Visualize View Help ifluid_b ifluid_nb 0100 alars 0200 S **XCoordinates** 0300 **YCoordinates** 0400 **ZCoordinates** 0500 0600 0700 Position: Element 10800 Units: s 8.55e-00) 10900 Range: [4.18536e-007, 1.83452e-005] 1000 pconn pf 1100 rand 1200 7.09e-00 rhoEf 1300 Time range: 0 - 0 (7.8 - 7.8) 5.64e-00 First 0 Last: 0 Current: 0 7.8 7.8 On Renderer: N: 81270 E: 76720 500 x 500

Rocketeer

- Glyphs
 - Particles
 - Vector fields
- Isosurfaces
- 3-D mesh plots
- Opacity controls
 - Constant
 - Value-dependent
- Thresholds
- Animation
 - Output series
 - Moving camera
- Stand-alone, client/server, and batch versions



Titan Joint Slot Simulation

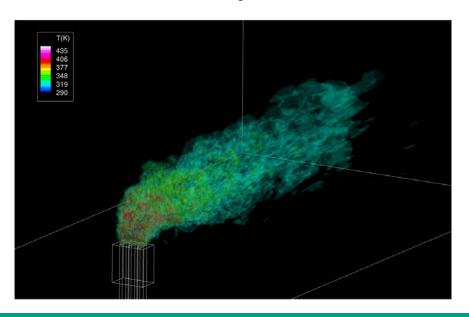


Velocity (in core flow) and stress (in grain)

- Flow interaction over lip caused low pressure downstream
- Grain collapsed inward
- Ultimately grain separated from case and destroyed booster
- Multiphysics simulation would have demonstrated problem

Loading Rocstar Files into Tecplot

- HDF4 to Tecplot conversion utility: <build>/bin/hdf2plt
- Usage: hdf2plt -regex "hdf files to convert " -o <filename>.dat
- Available command line flags for hdf2plt:
 - --regex "{somestring}*.hdf": specifies a set of hdf files
 - -g: enables ghost node inclusion in the output file
 - -o {outputfile} : Specifies output file. Output is printed to STDOUT by default



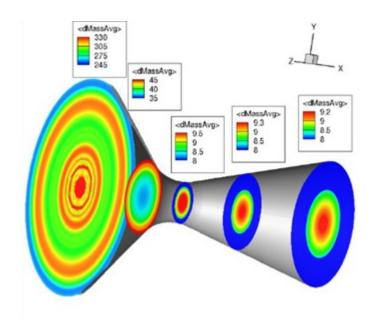
Heated jet into crossflow. Three rectangular ducts. *Rocflo* simulation plotted with Tecplot



Rocstar Partitions to Tecplot

Information on grid partitioning

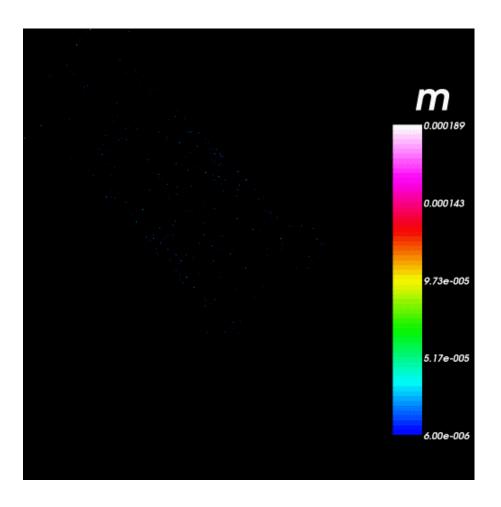
- Rocstar partitions grids with M original blocks into N sub-blocks for running on N processors (N >= M)
- Rocstar solution files are written by partitioned block, with each block represented by a separate .hdf file
- An N-processor run will produce N .hdf files
- Each hdf file will be translated to separate zone of the single Tecplot file produced by hdf2plt
- Note: The University of Illinois version of hdf2plt will produce discontinuous zone boundaries when visualized in Tecplot
 - New version under production



Particle statistics as particles traverse and breakup in nozzle throat.



BATES Efficiency



- 15 lb BATES motor
- Studied effects of different aluminum loadings on ISP (AIAA-2005-3997)
- Full 3-D fluid solution with Lagrangian particles
- Coupled fluid-combustion model
- New model for Aluminum and Al₂O₃ Phase change just added to *Rocflo*



Loading *Rocstar* Files into Tecplot

- Preplot (Tecplot utility)
 - hdf2plt writes an ascii Tecplot file that can be quite large (many Gb)
 - Converting this file into Tecplot's binary format (appended with .plt) saves time transferring and loading solution files
 - Preplot is a Tecplot utility for performing this conversion. It is included in a standard Tecplot installation and can be distributed freely
 - Usage: \$ preplot <filename>.dat
 - Generates: <filename>.plt

Loading fluid solution file into Tecplot

 After conversion, the .dat or .plt solution file can be loaded by the standard Tecplot data loader:

File->Load Data Files -> Tecplot Data Loader

Probe files

- The probe text files are not covered by an existing utility
- They can be loaded into Tecplot, Excel, etc. using the General Text Loader

Rocstar Data Visualization in Tecplot

- All of Tecplot's visualization and analysis tools can now be applied to the *Rocstar* simulation
- Allows deriving new variables, etc. that Rocketeer does not do

