

Visualizing Material Model Data Using PRISM

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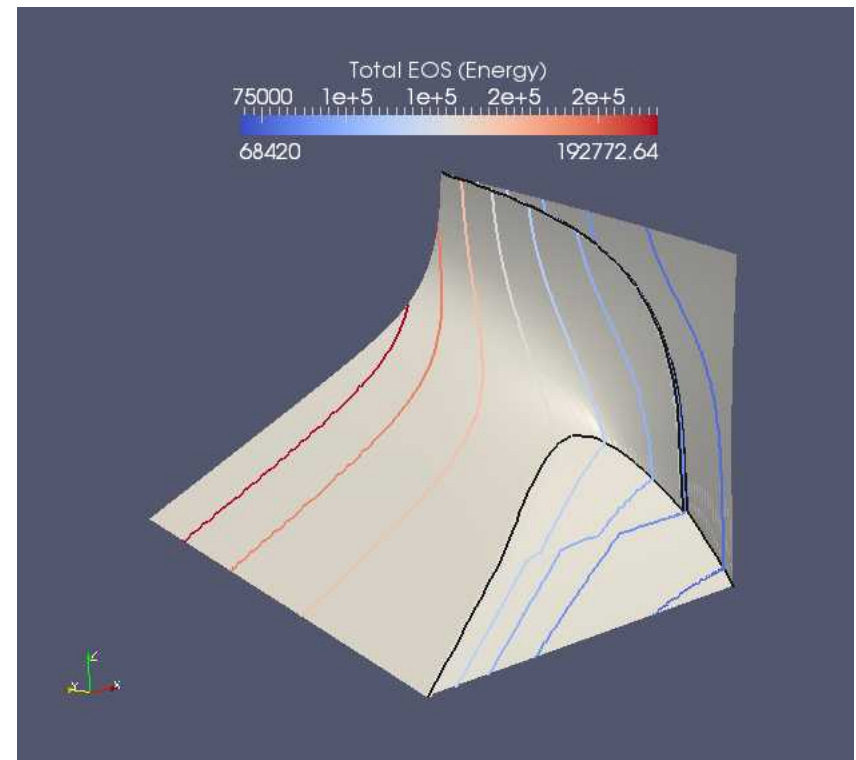
What is PRISM?

- PRISM is a plugin to ParaView
- The SESAME reader displays material model surfaces, generally equations-of-state and scalar properties
- The PRISM filter displays experimental or simulation data on the material model surface
- Intended for analysts and code developers

Display surfaces, contours, phase changes

Example:

- Pressure surface vs. Density and Temperature
- Contours of Energy
- Solid Melt, Liquid Melt, and Vaporization Curves



Flexible Unit Conversion

- Default conversions file includes cgs and SI. Users can add their own conversions to the file.

Conversions

File Name: SESAMEConversions.xml

Table: 301

☒ SESAME To SI ☐ SESAME To cgs ☐ Custom

Variable	Conversion	Factor
Density	Density - Mg/m ³ to kg/m ³	1000
Temperature	Temperature - K to K	1
Total EOS (Pr...	Pressure - GPa to Pa	1e+09
Total EOS (En...	Energy - MJ/kg to J/kg	1e+06



Display Simulation Data on Material Surfaces

- Element data
- Tracers in csv format (hscth format)
 - Should work for CTH and ALEGRA users
 - Others may need to reformat their data
- Linked selection: still buggy but fixes are in progress



Material Models Accepted

PRISM reads the complete SESAME specification (as described in LA-UR-92-3407)

- All table numbers (next slide)
- SESAME units
- ASCII format only, one material per file
 - LANL SESAME “ship” format
 - SNL “Kerley” format
- Additional variables beyond those defined by the format

PRISM works with SESAME *files*, not libraries

SESAME format is just a convenient file format; PRISM is not restricted to material models in the SESAME library



Types of SESAME Data Records

- Table 101 Comments
- Table 102 Comments
- [Table 201](#) Atomic Number, Atomic Mass, Normal Density
- [Table 301](#) Total EOS (304 + 305 + 306)
- [Table 303](#) Ion EOS Plus Cold Curve (305 + 306)
- [Table 304](#) Electron EOS
- [Table 305](#) Ion EOS (Including Zero Point)
- [Table 306](#) Cold Curve (No Zero Point)
- [Table 401](#) Vaporization Table
- [Table 411](#) Solid Melt Table
- [Table 412](#) Liquid Melt Table
- [Table 431](#) Shear Modulus Table
- [Table 501](#) Opacity Grid Boundary: Calculated vs. Interpolated
- [Table 502](#) Rosseland Mean Opacity
- [Table 503](#) Electron Conductive Opacity1
- [Table 504](#) Mean Ion Charge1
- [Table 505](#) Planck Mean Opacity
- [Table 601](#) Mean Ion Charge2
- [Table 602](#) Electrical Conductivity
- [Table 603](#) Thermal Conductivity
- [Table 604](#) Thermoelectric Coefficient
- [Table 605](#) Electron Conductive Opacity2



Future Work

- Bug fixes. As you find them, please report them – no one will try to fix a bug they don't know about.
- Solid mechanics models
- Visualizing material model uncertainties



Live Demonstration

Two plates in a symmetric impact

- ALEGRA Eulerian simulation, essentially 1-D
- No strength
- Fake material “proxium”
- Conditions chosen to be interesting in EOS space