BLAZE 7.1.3

Features

- MPI-based scalable parallel multiphysics simulation engine.
- Library of interoperable finite volume models.
- Includes steady-state, pseudo-steady-state, transient, and variable time step transient temporal schemes.
- Compatible with both commercial and free, powerful, open-source grid generation and post-processing software.
- User extendable – create and compile new models to work in tandem with provided engine/models.
- Large demonstration/verification/validation case library.
- Compatible with most modern systems, Windows, Macintosh, Unix/Linux, Distributed Memory Clusters.

Modules

- Pressure-Based Coupled Navier-Stokes Model
- Incompressible Potential Flow Model
- General Diffusion Model
- Gas/Material Property Model
- Electric Field Model
- Various 1- and 2-Equation Turbulence Models
- Nearest Wall Distance Model
- Neutral/Ion/Electron Specie Transport Model
- Non-Equilibrium Gas- Plasma- Photo-Kinetic Model
- Photon Transport Model
- Wave-Optics Model

Discretization

- Compatible with multiple grid formats.
- Compatible with single- and multi-block structured / unstructured 2- and 3-D grids.
- Compatible with triangle and quadrilateral first-order, two-dimensional elements, and with the tetrahedron, hexahedron, prism, and pyramid, first-order, three-dimensional elements.
- Automated grid partitioning for parallel simulation.
- Users can sub-divide grids and solve certain models on only user-defined portions, other models on full grid.
- High-order flux schemes with multiple flux blending schemes.

Temporal Resolution

- Solve using steady-state, pseudo-steady-state, transient, and variable time step transient temporal schemes.
- 1st – 4th order fully implicit time accurate schemes available with the fixed time step transient solver.
- CFL time step limiter.

User Modification

- Users can create, compile, and call their own parallel finite volume models from BLAZE using a provided API.
- BLAZE simulation engine handles all I/O, parallelism, memory management, parallel sparse linear system solution schemes, etc.
- Users can create, compile and call custom grid parsers.

Gas Specie & Chemistry Library

- Large and well validated gas specie database.
- Large and well validated gas- plasma- and photo-kinetic chemistry databases.

Post-Processing

- Compatible with multiple post-processing tools including the free, open-source, powerful ParaView and VisIt via open source data formats.
- Users can quickly analyze coupled results from steady-state and transient simulations.

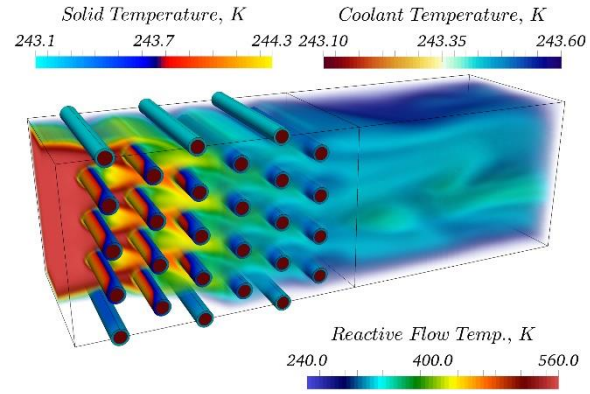

Fig. 1: Multiple Phase Domains

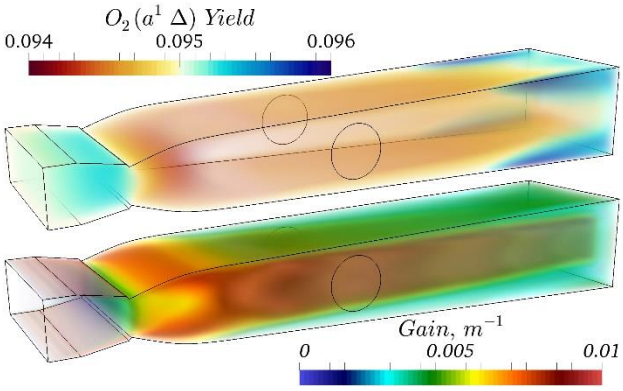

Fig. 2: Gasdynamic Reacting Flows

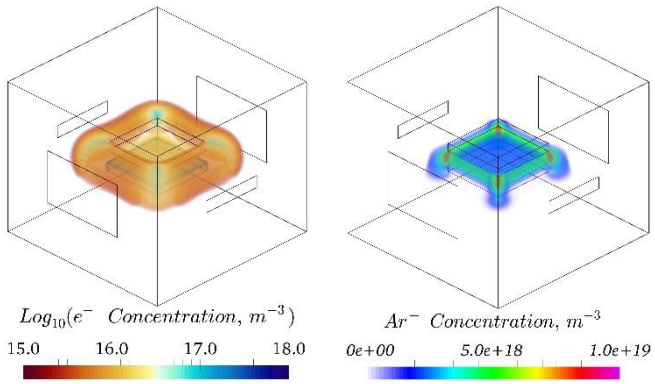

Fig. 3: Nonequilibrium Plasma Discharges

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