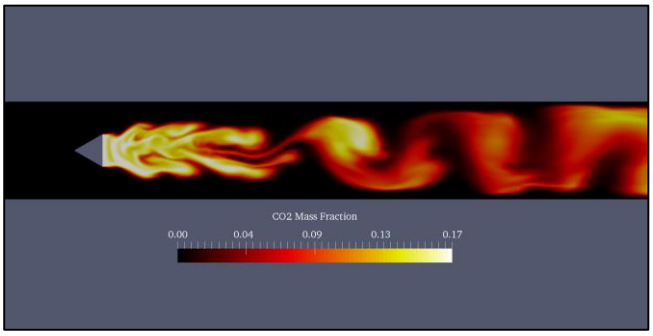
Version 6.04 (April 22, 2016)

Library enhancements

Discretization

- Surface Interpolation scheme restructuring:
  - **`linear`**: central-based interpolation reformulated to use TVD slope limiters. E.g. `div(phi,U) Gauss linearBJ`
  - **`limitedCentral`**: new scheme based is hybrid of of flux and slope limiting. E.g. `div(phi,U) Gauss limitedCentralBJ grad(U)`
  - **`linearUpwind`**: strictly uses TVD slope limiters. E.g. `div(phi,U) Gauss linearUpwindBJ grad(U)`
  - **`blended`**: uses TVD slope limiters and blends linear and linearUpwind schemes. E.g. `div(phi,U) Gauss blendedBJ grad(U)`. Additional entry can be appended to control blending ratio. Default ratio is 0.75 linear 0.25 linearUpwind.
  - Multi-dimensional limiting applying limiting to each direction. E.g. `div(phi,U) Gauss linearUpwindMDBJ grad(U)`
  - Deferred correction schemes treat the high order correction explicitly. Can help with convergence on non-optimal meshes. E.g. `div(phi,U) deferredCorrection Gauss dcLinearUpwindBJ grad(U)`
  - An additional entry can be appended to control accuracy. E.g. `div(phi,U) Gauss linearUpwindBJ grad(U) 0.5` would yield formal accuracy of 1.5.
- `TVD limiters`: all limiters verified to conform to the Total Variation Diminishing (TVD) regions.
  - `BJ` – (Barth-Jesperson) slight compressive limiter
  - `DL` – (Venkatakrishnan) differentiable limiter
  - Minmod – strict adherence to TVD
  - `MG` – (Michalak-Olivier-Gooch) differentiable limiter
  - `Koren` – compressive limiter
  - `Superbee` – overcompressive limiter
  - `UMIST` – strict adherence to TVD
  - `vanLeer` – strict adherence to TVD
  - `vanAlbada` – strict adherence to TVD
- Surface interpolation schemes unified to eliminate need to specify "V" for vector versions. For example, `linearBJ` would be applicable for both scalar and vector fields.



CO_2 mass fraction contours from problem solution using `reactingSolver` combustion solver in Caelus v6.04

Solvers

Combustion

- **`reactingSolver`**: fractional step based transient solver for compressible combustion flows with the Arrhenius rate chemistry ODE solver.

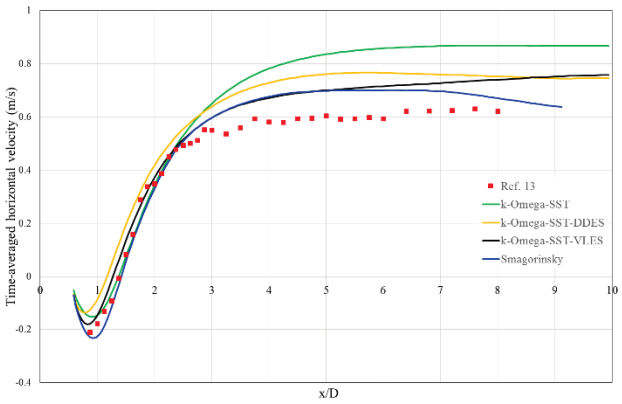
Compressible

- **`cpbnsLTS`** and **`cpbnsPIMPLE`**: reformulated to use limited/unlimited central flux formulation.
- **`explicitDBNSSolver`**: added dominant wave numeric flux formulation.

Models

Turbulence

- Added **`kOmegaSSTDES`** and **`kOmegaSSTDDES`** DES models
- Added **`gammaReTheta`** transition RAS model
- Added **`SpalartAllmaras`** VLES model.
- Explicit control of near wall behavior for VLES model class. Default corresponds to RANS but can be overridden to be consistent with LES.



Streamwise distribution of the normalised time-averaged horizontal velocity along the centreline from Rudimentary Landing Gear (RLG) benchmark case using kw-SST DDES turbulence model in Caelus v6.04. Stephens et al., "A two equation VLES turbulence model with near-wall delayed behaviour", APISAT 2015