



# Overall CRUNCH CFD<sup>®</sup> Features

|  |  |
|--|--|
| <b>NUMERICS</b>                                    | Finite-Volume / Roe / TVD Flux Construction / Vertex Storage.  |
| <b>INTEGRATION</b>                                 | Explicit 4-Step Runge-Kutta / Implicit GMRES / Implicit Gauss-Seidel.  |
| <b>GRID ELEMENTS</b>                               | Tetrahedral / Hexahedral / Prismatic / Pyramid.  |
| <b>PARALLEL PROCESSING CAPABILITIES</b>            | Domain Decomposition MPI / Independent Grids with Non-Contiguous Interfacing / Automated Load Balancing.   |
| <b>MULTI- PHYSICS FRAMEWORK</b>                    | Multiple flow modules for compressible and incompressible flow regimes that can operate on different flow domains and communicate with each other across non-contiguous boundaries e.g. a rotor-stator interaction problem |
| <b>DYNAMIC GRID CAPABILITIES</b>                   | Node Movement Solver (Implicit Elastic Approach) / Automated Embedding / Sliding Interfaces and moving bodies (Later release)  |
| <b>THERMOCHEMISTRY</b>                             | Multi-Component Real Gas Mixtures / Finite-Rate Kinetics / Gas-Liquid Mixtures.  |
| <b>TURBULENCE / RANS/LES</b>                       | Standard k- $\epsilon$ Model with Compressible Wall Function / Low Re Near-Wall Models / Gatski-Speziale EASM Model / 1-Equation LES model, Hybrid RANS/LES model  |
| <b>MULTI-PHASE</b>                                 | Phase Change for Liquid/Vapor Mixtures, Bubbly Cavitation Models   |
| <b>DEVELOPMENTAL</b>                               | Variable $Pr_t$ / $Sc_t$ Models / Spray Combustion Extensions  |
| <b>GRID ADAPTATION USING CRISP CFD<sup>®</sup></b> | Variable Element Grid Refinement Using Delaunay Procedure / Automated Load Balancing of Adapted Grid.  |