



Mathematical Modeling and Computation

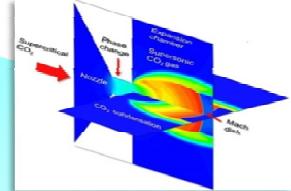
Yamamoto-Furusawa Laboratory



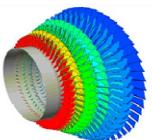
Wet-steam flow



Large-scale computing



Polymer nanoscale particles

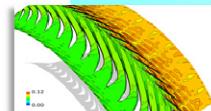


Unsteady multi-stage
multi-passage simulation

Numerical Turbine

Turbine whole flow simulation

Nonequilibrium condensation



Moist-air flows



Extension to aerospace



Multiphysics CFD

Supercritical-fluids Simulator(SFS)

Mathematical modeling of
supercritical fluids



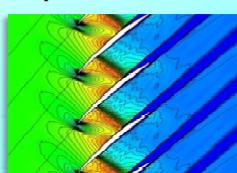
Metal nanoscale particles

Supercritical water

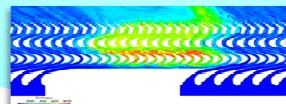


Extension to future technology

Supercritical CO₂



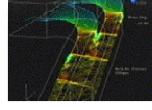
Liquid hydrogen



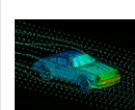
CFD



Shock



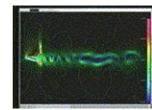
Sound/Noise



Shock/vortex
interaction



Ideal gas

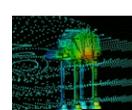


Vortex



Water

Single phase



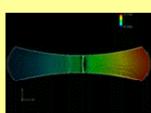
Multiphysics CFD

Multiphase

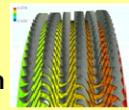


Reaction

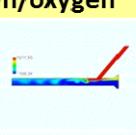
Condensation



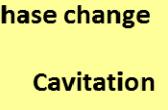
Material Interaction



Friction



Boiling



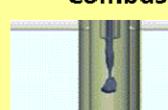
Phase change

Liquid hydrogen/oxygen

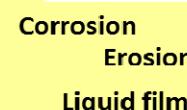
Adhesion



Cavitation



Combustion



Corrosion

Erosion

Liquid film

Supercritical CO₂

Supercritical water

Nucleation

Numerical Turbine

Supercritical Fluids Simulator (SFS)

Navier-Stokes Equations

+

Mathematical Models