Propulsion Technologies

The **Propulsion Technologies Group** is dedicated to the **generation of advanced simulation software** for propulsion and power applications.

Objectives

The **Propulsion Technologies Group** is actively working on the following technological areas:

1. Combustor design and operability: lean prevaporized premixed combustion (LPP), Rich-Burn, Quick-Mix, Lean-Burn (RQL), swirl-stablized and jet flames.
2. Combustion of liquid biofuels for transportation.
3. Fuel injection, atomization and evaporation.
4. Prediction of pollutant formation (soot, NOx, CO, ...) in aeroengines and internal combustion (IC) engines.
5. Shock-Induced Combustion Phenomena.
6. Power generation with synthetic gases and hydrogen-enriched fuels.
7. Disruptive propulsion technologies: plasma-assisted combustion and combustion of nanoparticles.

The **Propulsion Technologies Group** is developing advanced simulation methodologies to address fundamental challenges encountered in combustion systems to increase the efficiency and performance of current and new power and transportation sectors.

1. Advanced numerical schemes for mutiphase reacting flows.
2. Eulerian-Eulerian and Eulerian-Lagrangian frameworks for particle transport.
3. Turbulent combustion modelling for multiregime combustion phenomena.
4. Dynamic adapative chemistry and chemistry reduction for combustion simulations.
5. Primary breakup and droplet extraction methods for multiphase flows.
6. HPC-enabling technologies for large-scale multiphase reacting flow simulations.
7. Hybrid CPU/GPU implementations for multiphase reacting flows.
8. Application of Machine Learning in turbulent combustion and multiphase flows.

Barcelona Supercomputing Center - Centro Nacional de Supercomputación

---