

BLOWDOWN R1Ch & R2Ch WIND TUNNELS

Research and Innovation

Super and cold hypersonic aerodynamics

Main applications: launcher, missile, nozzle, bluff bodies

Research: laminar flow, stability, transition, flow control, metrology for high speed flows

FEATURES

Blowdown wind tunnels, 2 parallel test sections (R1Ch & R2Ch) 250bar compressed air injection, outflow to atmosphere or vacuum chamber

- Free jet
- Compressed air reservoir 30m³ 250bar, vacuum chamber 500m³
- Low pressure in test section using (min 1mbar) 3 Leybold pumps + Aerzen pump
- Heat production 750K
- Partially automated process

R1Ch wind tunnel

- Mach 3/5 nozzles diameter D= 0,311 / 0,327 m
- Stagnation pressure 1 to 15 bar
- Stagnation temperature < 400 K
- Max flow rate 80 kg/s
- Reynolds (/meter) 4 à 125 M



Test section
L=1,570m, l=1,055m, h=1,8m

R2Ch wind tunnel

- Nozzles Mach 3, 4 diameter D = 0,190 m
- Nozzles Mach 5/6/7 diameter D = 0,327 m
- Stagnation pressure 1 to 70 bar
- Stagnation temperature < 750K
- Max flow rate 40 kg/s
- Reynolds (/meter) 1 à 130M



Test section
L=1,570m, l=1,055m, h=1,8m

MAIN TESTING CAPABILITIES

Data acquisition system 200 inputs (low frequency) and 32 inputs (high frequency), special arrangements on demand

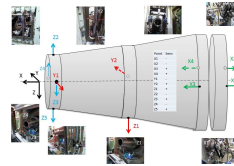
- Large diameter Schlieren rigs
- Linear displacement system & turn table
- Infrared testing room
- Secondary jet

CONTACT

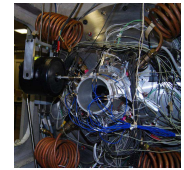
<https://www.onera.fr/en/daaa/contact>

MAIN TESTING CAPABILITIES

Aerodynamic characterization of loads: force sensor integration on various setups

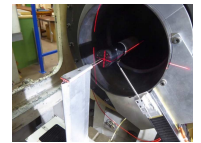
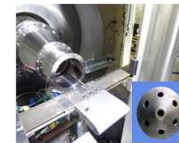


6-components force measurement for a nozzle

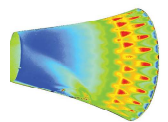
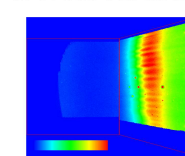


Modal analysis for a launcher type nozzle

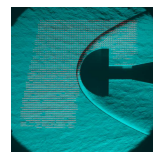
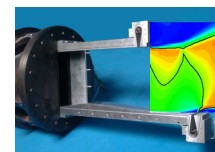
Wall pressure using miniature sensors and taps, flow traverse using Pitot and temperature probes



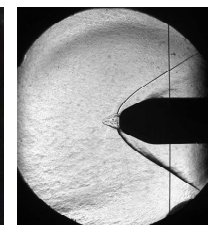
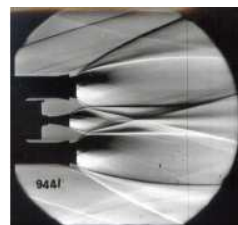
Infrared heat flux measurements / Pressure Sensitive Paint



Laser Doppler Velocimetry / Particle Image Velocimetry



Visualisations (Schlieren, oil flow)



Plasma for flow control

