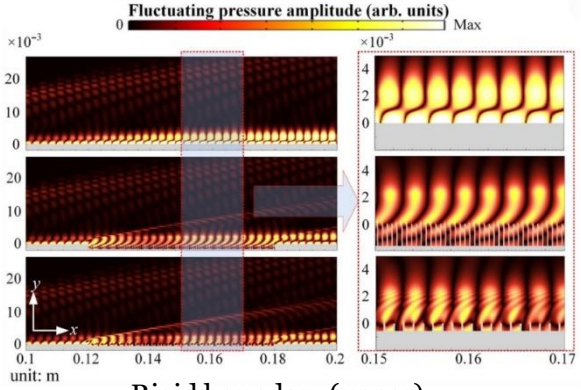
Aerodynamics

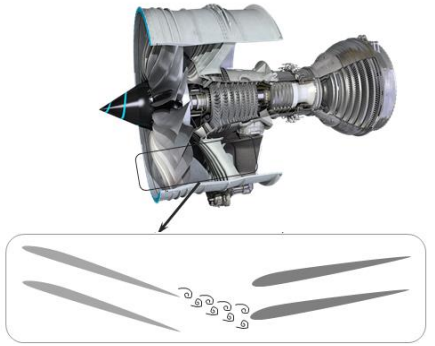
Laminar–turbulent transition: Acoustic metasurfaces

- Develop an impedance model to theoretically describe the acoustic characteristics of porous coatings with uniform subwavelength 2-D slits or 3-D pores, incorporating the mutual coupling among neighbouring microstructures
- Design 3 types of acoustic metasurfaces *(Right)* for the control of hypersonic boundary-layer transition and a reflection-controlled metasurface

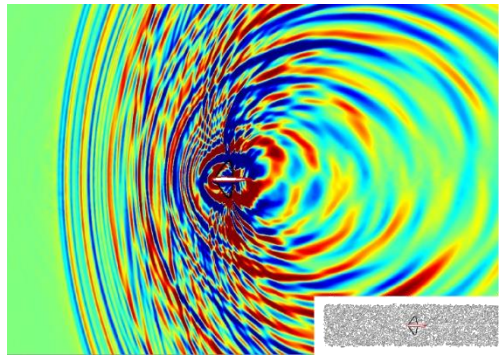


Rigid boundary (upper), Impedance-matched metasurface (middle), Impedance-near-zero metasurface (lower)

Analytical and computational investigation of airfoil-turbulence interaction noise

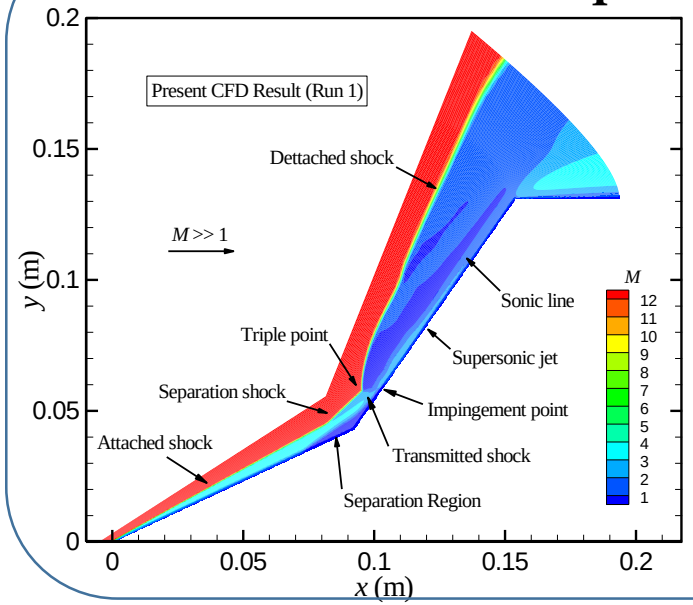


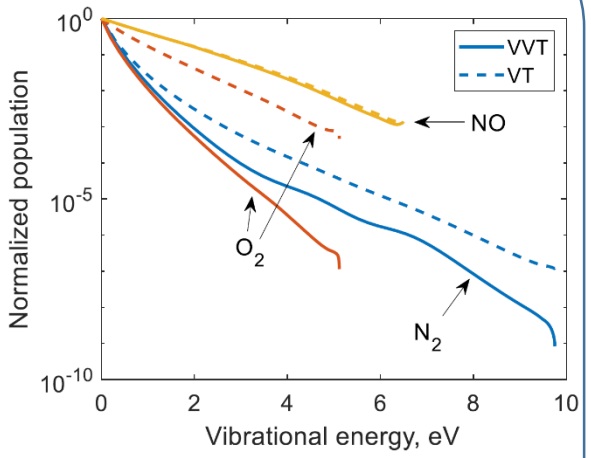
A schematic of the airfoil-turbulence interaction noise in aeroengine applications



Airfoil-turbulence noise in transonic flows using CAA.

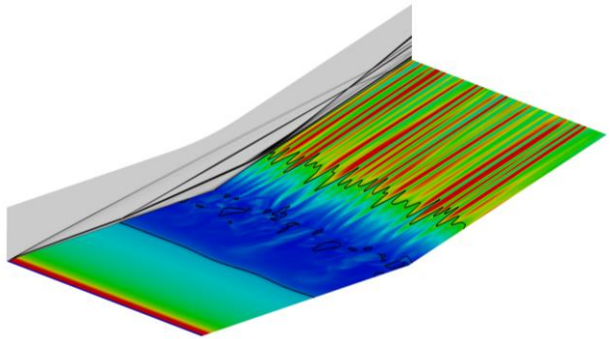
Thermochemical nonequilibrium simulations





Vibrationally state-to-state simulations of air species behind a normal shock

Shock-wave/boundary-layer interaction



DNS results of hypersonic flows (Ma = 7.7) over a compression ramp.

Major Research Facility:
Ludwieg supersonic-to-hypersonic wind tunnel