

Turbulence – shockwave interaction

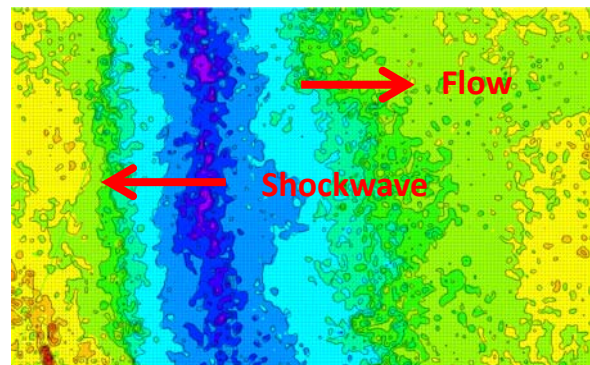
Abstract

Development of next generation hypersonic passenger aircraft is being promoted in JAXA. For realizing the hypersonic aircraft, the sonic boom(shockwave) is a serious issue. Therefore, it is important to clarify the mechanism of interaction between atmospheric turbulence and shockwave. We are measuring the property of turbulence affected by shock wave in the large wind tunnel. Using PIV(particle image velocimetry), we measure the instantaneous velocity field at the exact moment a shockwave propagates through the turbulent field.

Turbulence– shockwave interaction experiment in large wind tunnel and shock tube (visualization measurement by PIV)

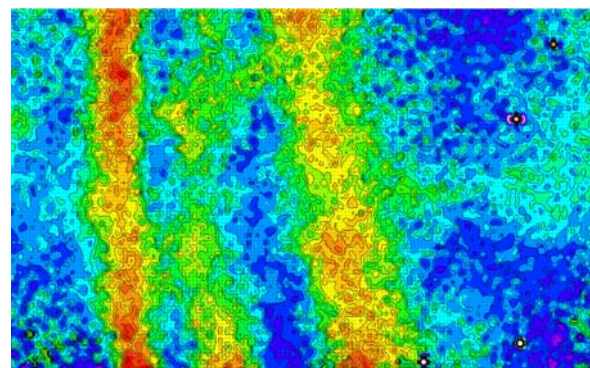


Gottingen type large wind tunnel



Instantaneous flow field

Planar measurement of instantaneous flow field at the exact moment a shockwave propagates



Turbulent intensity after shockwave pass

- Sasoh et al., Statistical Behavior of Post-Shock Overpressure Past Grid Turbulence , Shock Waves (2014).
- Kitamura et al., On invariants in grid turbulence at moderate Reynolds numbers, J. Fluid Mech. (2013)