Abstract Submitted
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Receptivity at the nozzle lip of under-expanded supersonic impinging jets[1] SHAHRAM KARAMI, LTRAC, Department of Mechanical and Aerospace Engineering , Monash University, Clayton Campus, Melbourne, VIC3800, Australia, VASSILIOS THEOFILIS, School of Engineering, University of Liverpool The Quadrangle, Brownlow Hill, L69 3GH, UK, JULIO SORIA, LTRAC, Department of Mechanical and Aerospace Engineering , Monash University, Clayton Campus, Melbourne, VIC3800, Australia — The receptivity of an under-expanded supersonic impinging jet flow at the sharp nozzle lip to acoustic impulse disturbances is investigated as a function of geometric and flow parameters. Receptivity is defined as the internalisation of an external disturbance into the initial condition that either initiates or sustains a vortical instability. In the case of under-expanded impinging jet flow subjected to an acoustic disturbance receptivity is located at the nozzle lip and amenable to an impulse response analysis using the linearised compressible three-dimensional Navier-Stokes equations. Under-expanded supersonic jets emanate from an infinite-lipped nozzle with a nozzle pressure ratio of 3.4 for two nozzle-to-wall distances (h) of 2 and 5 jet diameters have been studied. It is found that for both cases, acoustic disturbances located at angles greater than 80^o from the jet centreline have the highest receptivity for all azimuthal mode-numbers, except the azimuthal mode-number 2 for h=5d. For h=5d there is also high receptivity to acoustic disturbances located at angles 15^o - 50^o from the jet centreline for all azimuthal mode-numbers.

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