Abstract Submitted
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**Impinging Tone Identification of Under-expanded Impinging Jets by Large Eddy Simulation.**[1] MINGHANG LI, The University of Melbourne, SHAHRAM KARAMI, Laboratory for Turbulence Research in Aerospace & Combustion (LTRAC), Monash University, RICHARD SANDBERG, The University of Melbourne, JULIO SORIA, Laboratory for Turbulence Research in Aerospace & Combustion (LTRAC), Monash University, ANDREW OOI, The University of Melbourne — The acoustic and hydrodynamic feedback mechanism to predict discrete tones was first proposed by Powell ($J.Acoust.Soc.Am., vol.83(2), 1988, pp.515533$). The mechanism consists of the receptivity of the shear layer at the nozzle lip as well as the acoustic contribution from the downstream sources. The first part of the mechanism has been commonly accepted, while the locations of the downstream sources are still under debate. To further understand the mechanism, this work aims to identify the locations of the impinging tones by a novel methodology utilising the cross correlation and a ray tracing method. Each potential source is found with a certain ray tracing back to the nozzle exit. Joint probability density functions are then used to identify the impinging tones. Since the mean temperature out of the main jet plume and the wall jet varies little, another simplified method that does not consider refraction effects is proposed. Data from a recent Large Eddy Simulation is used to validate the current methods. The identified source locations are quantitatively determined and consistent with the second maximum of the root mean square of the pressure on the wall.

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Minghang Li
The University of Melbourne

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