Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Sound Sources in Subsonic Twin Turbulent Jets ARNAB SAMANTA, NISHANTH MUTHICHUR, SANTOSH HEMCHANDRA, Indian Institute of Science — We analyse the sound from merging identical twin $M_j = 0.9$ turbulent cold jets to explore how the radiation mechanisms differ from corresponding single jets via focusing on the role of jet shear layers in breaking down the organized structures of the individual jets. Such twin jets are known to reduce noise via shielding, at least at their merging planes, while these may dynamically couple and increase sound at the other cross planes, once placed close to each other. Here, we study this via varying the point of first interaction between the pair of jets which include a case where the jets first interact approximately at their potential core breakdown location, while in the other cases they merge some distance upstream and downstream of this point. We follow a hybrid approach where the near-field is computed using an LES, while a Lighthill's-based analogy yields the radiated sound. On comparing with the well-validated single jet results, the twin jet evolution and their sound spectra appear very different, especially for the jets with the closest spacing which also show higher-frequency discrete tones. We seek to explain the observed differences via careful analysis of the respective sound sources using a range of techniques including constructing the respective SPOD modes.

Arnab Samanta
Indian Institute of Science

Date submitted: 01 Aug 2019 Electronic form version 1.4