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Source location prediction of subsonic isothermal jet flows

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The location of jet noise sources is a far from trivial problem that is of great importance for both understanding the noise production and radiation mechanisms and also for finding new jet noise reduction strategies. This paper presents comparisons of theoretical results with data for a number of jets. The theory used is based on the MGBK method but including a novel time scale based on the rate of energy transfer through the turbulent cascade. This new technique has been shown to give a number of advantages over existing models. The experimental results were obtained using the Polar Correlation Technique and were made at QinetiQ's Jet Noise Facility in the UK as part of the EU FP6 programme CoJeN. The high resolution jet noise images resulted from using a 64 microphone polar arc array set at two reference angles, namely 60 and 90 degrees to the jet axis. Comparisons with experimental data are made for coplanar and short cowl nozzles at different working conditions for predictions from different theoretical models. It is shown that the best agreement is obtained for the prediction methodology using the energy transfer rate timescale