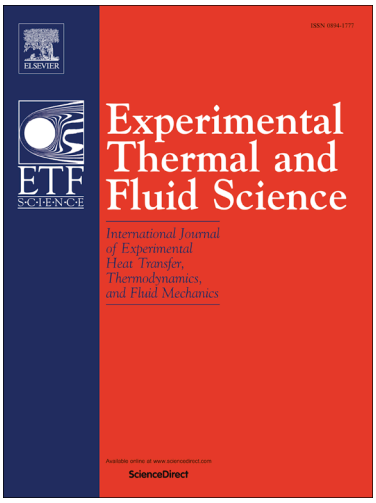


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# ASSESSMENT OF SYNTHETIC ENTROPY WAVES FOR INDIRECT COMBUSTION NOISE EXPERIMENTS IN GAS TURBINES

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## ABSTRACT

The reduction of aero-engine core-noise, i.e. the one generated in the combustor and in the high-pressure turbine, is a crucial objective for the deployment of low noise propulsion systems. Indirect entropy noise, produced by the propagation within the turbine of combustor-induced entropy waves, is believed to contribute significantly to the core-noise, and still demands a proper experimental demonstration in the turbomachinery environment. To fill this gap, dedicated experiments have been recently carried out in the high-speed turbine facility of the Politecnico di Milano, in which synthetic entropy waves are used to simulate the effects of the burners. The present paper discusses the generation and characterization of synthetic entropy waves for entropy noise experiments in turbines.

The entropy waves are generated by injecting alternated spots of hot and cold air, by using a two-way rotary valve and a pneumatic distribution system. These synthetic entropy waves were experimentally characterized in a nozzle test-section as well as in the actual turbine facility used for indirect noise experiments. Time-resolved total temperature and total pressure measurements were performed by means of a fast thermocouple and a pneumatic pressure probe, both of them specifically developed for the present study. A computational model of the entropy wave propagation process was also constructed to investigate the injection process in detail.