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# THERMAL SCIENCE

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### VELOCITY MEASUREMENTS AND FLOW STRUCTURE VISUALIZATIONS OF A SELF-SUSTAINED OSCILLATING JET

#### ABSTRACT

The purpose of this study is the experimental investigation on self-sustained oscillating jet characteristics. Main aim was to describe vortical structures of turbulent air jet issuing from the nozzle of special configuration, modified by the controlled oscillations in free jet setup. In the present experiments was used so-called "whistler-nozzle", a simple-structured device capable to induce self-sustained excitations with controllable frequencies depending on the nozzle geometrical configuration. The frequency of the excitation measured with a far-field condenser microphone probe was around 1-2 kHz. The jet Reynolds number was in the range 48,000-95,000 in all experimental conditions presented in this paper. Flow field velocity measurements were provided in the free jet setup, with and without self-sustained excitations. The images of both free and impinging jets were taken with a high-speed digital video camera. The flow field and structure of the jet were found to be extremely sensitive to the excitation and dependent on the excitation conditions. This fact can lead to the conclusion that the local heat transfer characteristics of jet impingement are also remarkably dependent on the jet excitation.

#### KEYWORDS

self-sustained oscillation, whistler nozzle, impinging jet, velocity measurement, flow structure visualization

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