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**Velocity measurements in a thermoacoustic refrigerator using Time-Resolved Particle Image Velocimetry** PHILIPPE BLANC-BENON, LMFA, UMR 5509, Ecole Centrale Lyon, France, GAELLE POIGNAND, LAUM UMR CNRS 6613, ARGANTHAEL BERSON, Durham University, EMMANUEL JONDEAU, LMFA, UMR CNRS 5509, Ecole Centrale Lyon — A standing-wave thermoacoustic refrigerator consists of a stack of plates placed in an acoustic resonator with two heat exchangers located at each end of the stack. The full understanding of the heat transfer between the stack and the heat exchangers of thermoacoustic systems is a key issue to improve the global efficiency of such devices. The aim of this work is to investigate the generation of vortices near the ends of the stack, which affects heat transfer. The aerodynamic field in the gap between the stack and the heat exchanger is characterized using a time-resolved particle image velocimetry technique. Measurements are performed in a standing-wave refrigerator operating at a frequency of 200 Hz. Instantaneous velocity fields are recorded at a frequency of 3125 Hz (i.e. 15 velocity fields per acoustic period). Measurements show that vortex shedding occurs at high pressure levels, when the nonlinear acoustic regime prevails and they validate previous experiments [Berson & Blanc-Benon, J. Acoust. Soc. Am., 2007, 122(4), EL122-127]. The increased viscous dissipation generates additional heating and a loss of efficiency.

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