Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Parametric Study on the Evolution of Thermal Patterns and Coherent Flow Structures in the Rotated Arc Mixer OZGE BASKAN, MICHEL SPEETJENS, Eindhoven University of Technology, GUY METCALFE, Commonwealth Scientific and Industrial Research Organisation, HERMAN CLERCX, Eindhoven University of Technology — Advective-diffusive scalar transport in spatially or temporally periodic flow fields has been investigated in numerous studies, which exposed that the global transport relies on the kinematic/geometric parameters governing the advection and the ratio between the advective and diffusive time scales. These studies mainly employ numerical/analytical methods. However, experimental analysis remains outstanding. This research concerns an experimental parametric study on the evolution of the thermal patterns in a representative configuration, the Rotated Arc Mixer (RAM), and its correlation with the coherent flow structures. The RAM is an inline mixer composed of a stationary inner cylinder with systematically oriented apertures and a rotating outer cylinder inducing transverse flow at the apertures. Design of the experimental facility is based on a 2D time-periodic simplification of the 3D spatially-periodic RAM, where the cross-sectional progression is represented by the temporal evolution. The test section is a shallow circular tank with apertures on the circumference and motor-driven belts imitate the rotating outer cylinder of the RAM. Circumferential temperature is kept constant via an enclosing hot-water reservoir. The 2D flow and temperature fields are measured by 2D Particle Image Velocimetry and Infrared Thermography and analyzed.

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Date submitted: 02 Aug 2013 Electronic form version 1.4