

Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Numerical study of vorticity-enhanced heat transfer XIAOLIN WANG, Georgia Tech, SILAS ALBEN, University of Michigan — Vortices produced by vibrated reeds and flapping foils can improve heat transfer efficiency in electronic hardware. Vortices enhance forced convection by boundary layer separation and thermal mixing in the bulk flow. In this work, we modeled and simulated the fluid flow and temperature in a 2-D channel flow with vortices injected at the upstream boundary. We classified four types of vortex streets depending on the Reynolds number and vortices' strengths and spacings, and studied the different vortex dynamics in each situation. We then used Lagrangian coherent structures (LCS) to study the effect of the vortices on mixing and determined how the Nusselt number and Coefficients of performance vary with flow parameters and Peclet numbers.

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Date submitted: 01 Aug 2013

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