Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Gap vortex streets and turbulence in time-dependent streams[1]
DAN DUONG, STAVROS TAVOULARIS, University of Ottawa — Gap vortex streets form in axial flows in highly eccentric annular channels, tightly packed rod bundles and other channels having narrow gap regions flanked by wider ones. The characteristics of these vortices and the flow and turbulence distributions in some of these channels have in the past documented for steady streams; in particular, the vortex generation frequency was found to be proportional to the bulk Reynolds number. The present study extends these findings to both accelerating and decelerating air flows in a large-scale rod bundle, configured as a wind tunnel with a by-pass branch equipped with a controlled movable flap just downstream of the blower. Time-dependent statistical properties in a gap and a subchannel centre were determined by phase-averaging velocity measurements collected with hot-wire anemometers and the time history of the phase-averaged vortex street frequency was determined with the use of a wavelet transform. Contrary to expectations, the results show that deviations of the vortex frequency and other flow characteristics from the corresponding values in steady flows at the same bulk Reynolds number were significant during acceleration and much less so during deceleration.

[1]Supported by the Natural Sciences and Engineering Research Council of Canada and the Canadian Nuclear Laboratories

Stavros Tavoularis
University of Ottawa

Date submitted: 22 Jul 2016 Electronic form version 1.4