Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

**On the Analysis of Flows in Vibrating Channels**[1] SAHAB ZANDI, University of Western Ontario, ALIREZA MOHAMMADI, Princeton University, JERZY MACIEJ FLORYAN, University of Western Ontario — Pressure losses in channels with vibrating walls have been analyzed. Surface vibrations were assumed to have the form of travelling waves. The waves can have arbitrary profiles. The spectrally accurate immersed boundary conditions (IBC) method based on the Fourier expansions in the flow direction and the Chebyshev expansions in the transverse direction has been developed. The results show dependence of the pressure losses on the phase speed of the waves, with the waves propagating in the downstream direction reducing the pressure gradient required to maintain a fixed flow rate. A drag increase is observed when the waves propagate with a phase speed similar to the flow velocity. Analytical solution demonstrates that the drag changes result from the nonlinear interactions and vary proportionally to $A^2$ for small enough $A$, where $A$ stands for the wave amplitude.

[1]This work has been carried out with support from the Natural Sciences and Engineering Research Council (NSERC) of Canada.

Jerzy Maciej Floryan
University of Western Ontario

Date submitted: 30 Jul 2015 Electronic form version 1.4