Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Revisiting Vortex Induced Vibration scaling in single degree of freedom systems[1] VAHID AZADEH RANJBAR, NIELL ELVIN, YIANNIS ANDREOPOULOS, CUNY-CCNY — VIV scaling illustrates that the oscillation amplitude of a SDOF circular cylinder mounted on the tip of a flexible cantilever beam is directly proportional to the forcing function and inversely proportional to the damping terms. Past studies that have not considered aerodynamic damping, have showed infinite oscillation amplitude for zero Skop-Griffin number which is unrealistic. A configuration containing a force sensor, strain gauges and a high speed camera is set up to measure aerodynamic forces and damping for stationary and oscillating circular cylinders. Results show that circular cylinder oscillation significantly affects the vortex shedding and consequently aerodynamic forces and damping*. Experimental data show that aerodynamic damping is directly proportional to oscillation amplitude but this relationship is non-linear for the aerodynamic force. These experimental data have been used to revisit VIV scaling. Comparison between our experimental data and experimental data of past studies in Griffin plot under the new scaling have showed very good agreement.

[1]Work supported by National Science Foundation under Grant No. CBET #1033117.

Vahid Azadeh Ranjbar
CUNY-CCNY

Date submitted: 01 Aug 2015 Electronic form version 1.4