Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Non-linear scale interactions in a forced turbulent boundary layer[1] SUBRAHMANYAM DUVVURI, BEVERLEY MCKEON, California Institute of Technology — A strong phase-organizing influence exerted by a single synthetic large-scale spatio-temporal mode on directly-coupled (through triadic interactions) small scales in a turbulent boundary layer forced by a spatially-impulsive dynamic wall-roughness patch was previously demonstrated by the authors (*J. Fluid Mech.* 2015, *vol.* 767, R4). The experimental set-up was later enhanced to allow for simultaneous forcing of multiple scales in the flow. Results and analysis are presented from a new set of novel experiments where two distinct large scales are forced in the flow by a dynamic wall-roughness patch. The internal non-linear forcing of two other scales with triadic consistency to the artificially forced large scales, corresponding to sum and difference in wavenumbers, is dominated by the latter. This allows for a forcing-response (input-output) type analysis of the two triadic scales, and naturally lends itself to a resolvent operator based model (e.g. McKeon & Sharma, *J. Fluid Mech.* 2010, *vol.* 658, *pp.* 336-382) of the governing Navier-Stokes equations.

[1]The support of AFOSR (grant #FA 9550-12-1-0469, program manager D. Smith) is gratefully acknowledged.

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Date submitted: 28 Jul 2015 Electronic form version 1.4