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**Phase relations of triadic scale interactions in turbulent flows**[1]
SUBRAHMANYAM DUVVURI, BEVERLEY MCKEON, California Institute of Technology — The quadratic nature of non-linearity in the Navier-Stokes (NS) equations dictates the coupling between scales in a turbulent flow to be of triadic form. An understanding of the triadic coupling affords good insights into the dynamics of turbulence, as demonstrated by Sharma & McKeon (*J. Fluid Mech.*, 2013) through analysis of the NS resolvent operator; a set of three triadically consistent spatio-temporal modes was shown to produce complex structures such as modulating packets of hairpin vortices observed in wall-bounded turbulent flows. Here we interpret Skewness ($Sk$) of velocity fluctuations and the Amplitude Modulation coefficient ($R_{am}$), proposed by Mathis, Hutchins & Marusic (*J. Fluid Mech.*, 2009), to be a measure of the large- and small-scale phase relationship. Through a simple decomposition of scales, both $Sk$ and $R_{am}$ are shown to be amplitude weighted (and normalized) measures of phase between scales that have direct triadic coupling. An analytical relationship is established between the two quantities and the result is demonstrated using experimental data from canonical and dynamically forced turbulent boundary layers presented in Duvvuri and McKeon (*AIAA* 2014-2883).

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