

Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

**Non-Gaussian Extension of the Sparse-Direct Interaction
Perturbation**¹ DAVID PETTY, CARLOS PANTANO, Univ of Illinois - Urbana

— An extension of the Sparse Direct-Interaction Perturbation (SDIP) technique is investigated with the objective to predict the theoretical Obukhov-Corrsin constant consistently with experimental observation. This extension involves relaxing the assumption that, in the case of a turbulent passive scalar field, third-order correlations between Non-Direct-Interaction (NDI) fields are identically zero. This is the leading order term in the traditional SDIP expansion. The theory of invariants and dimensional analysis provide a functional form of the retained third-order correlation, and integrability of its Fourier modes produces constraints on the remaining unknown parameters. To close the approximation, these unknown parameters are determined from direct numerical simulation of actively forced turbulent mixing. The resulting closure is then used to estimate the scalar spectral constant.

¹The authors would like to thank the grant support for this research provided by the Air Force Office of Scientific Research, and the Department of Energy

David Petty
Univ of Illinois - Urbana

Date submitted: 29 Jul 2016

Electronic form version 1.4