Edward E. O'Brien's Seminal Contributions to Turbulence Theory FOLUSO LADEINDE, Stony Brook University, CESAR DOPAZO, Universidad Zaragoza, PEYMAN GIVI, University of Pittsburgh — A brief overview will be presented of the influential contributions of Edward E. (Ted) O'Brien to the theory of turbulence, with an emphasis on scalar mixing and reaction. While perhaps best known for his work on the transported PDF methods, Ted's contributions are very diverse and consider a broad range of theoretical and computational approaches. In the 1960s, he made some very fundamental contributions to the spectral theory of reactive scalars, analyzed the consequences of passive scalar tagging using Corsin's "backward Lagrangian diffusion" concept, and contributed to the interpretation of Kraichnan's "direct interaction approximation" (DIA) for turbulent mixing. In the 1970s-1980s, he focused on scalar PD Functional and Function methods. In fact, he is widely recognized for introducing and popularizing single- and multi-point PDF closures, as well as the scalar-gradient PDF within the reactive turbulent flow community. In the 1990s, he focused on applying the EDQNM and the "amplitude mapping closure" (AMC) models, respectively to reactive turbulent scalars and mixing. With wider availability of supercomputers in the late 1990's-2000's, Ted utilized DNS for the development and appraisal of modern turbulence closures. He is also credited with introducing the "filtered density function" (FDF) transport equation for LES of turbulent reactive flows. In fact, he is the first to develop a transported scalar-FDF equation for multi-species turbulent reactive flows. Professor O'Brien's publications continue to be highly cited within the turbulence research community.

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