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Experimental study of an active grid-generated shearless mixing layer[1] HYUNG-SUK KANG, CHARLES MENEVEAU, Johns Hopkins University — The interaction between two dominant turbulence scales is investigated in a shearless mixing layer. The shearless mixing layer is composed of three regions, i.e., two nearly homogeneous decaying high- and low-energy regions, and a mixing region. There is no mean velocity gradient across the layer and so there is no production in the turbulent kinetic energy budget. Reynolds numbers higher than those of prior studies of this flow are achieved by combining an active grid with different winglets and stationary fine meshes to avoid mean velocity gradients. Measurements are performed at 5 different downstream locations in the Corrsin wind tunnel by using an X-type hot-wire probe and a stereoscopic PIV system. The Reynolds numbers based on the Taylor's microscale at the high- and low-energy regions are 250 and 110, respectively. The integral length scale ratio, defined as the integral length in the high-energy region to that in the low-energy region, is 2.65. Comparisons with earlier studies (Veeravalli & Warhaft 1989, Knaepen et al 2004, Tordella & Iovieno 2006) will be presented. The results are compiled into a database format to facilitate comparisons with Large-Eddy Simulations, and sample comparisons are presented.

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