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On the structure of pressure fluctuations of self-sustaining attached eddies[1] MINJEONG CHO, HAECHEON CHOI, Seoul National University, YONGYUN HWANG, Imperial College London — A numerical experiment, which isolates the energy-containing motions at a prescribed spanwise length scale, was recently performed by Hwang (2015, J. Fluid Mech., 767:254-289). In his study, the velocity structures of these motions were shown to emerge in the form of Townsends attached eddies. In the present study, pressure fluctuations of the self-sustaining attached eddies are analyzed for turbulent channel flow at $Re_\tau = 2000$. The second-order moment and the spectra of the pressure field of each attached eddy are found to be self-similar with respect to the given spanwise size, which is consistent with the velocity statistics. Depending on the nature of the source terms in the pressure Poisson equation, the pressure field of each attached eddy is also decomposed into the rapid and slow parts: the former describes linear interaction of the velocity fluctuation with mean shear, while the latter represents nonlinear interactions between the velocity fluctuations. In this talk, a detailed discussion will be provided with particular emphasis on the role of the rapid and slow parts of the pressure fluctuations in relation to its statistical and dynamical features.

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