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Isotropic boundary adapted wavelets for coherent vorticity extraction in turbulent channel flows MARIE FARGE, LMD-IPSL-CNRS Ecole Normale Supérieure, Paris, France, TELUO SAKURAI, KATSUNORI YOSHIMATSU, Nagoya University, Nagoya, Japan, KAI SCHNEIDER, M2P2-CNRS and CMI, Aix-Marseille University, Marseille, France, KOJI MORISHITA, Kobe University, Kobe, Japan, TAKASHI ISHIHARA, Nagoya University, Nagoya, Japan — We present a construction of isotropic boundary adapted wavelets, which are orthogonal and yield a multi-resolution analysis. We analyze DNS data of turbulent channel flow computed at a friction-velocity based Reynolds number of 395 and investigate the role of coherent vorticity. Thresholding of the wavelet coefficients allows to split the flow into two parts, coherent and incoherent vorticity. The statistics of the former, i.e., energy and enstrophy spectra, are close to the ones of the total flow, and moreover the nonlinear energy budgets are well preserved. The remaining incoherent part, represented by the large majority of the weak wavelet coefficients, corresponds to a structureless, i.e., noise-like, background flow and exhibits an almost equi-distribution of energy.

Kai Schneider
M2P2-CNRS and CMI, Aix-Marseille University, Marseille, France

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