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A novel time-to-space conversion method bypassing the problems with Taylor's hypothesis caused by fluctuating convection velocities CLARA VELTE, Technical University of Denmark, PREBEN BUCHHAVE, Intarsia Optics — A novel conversion of point-measured temporal turbulence power spectra to wavenumber space is proposed. By converting the temporal measurement records into spatial connected streakline elements, the classical assumption of a local mean velocity in Taylor's hypothesis can be completely bypassed. Laser Doppler velocimetry measurements, which in themselves are particularly suitable for application of this technique, taken at different off-center positions in a round turbulent jet are then used to demonstrate the difference between the current and the classical temporal-to-spatial domain conversions. The novel method displays the same behavior as observed from true spatial spectra measured along homogeneous directions in the very same turbulent axisymmetric jet, while the classical Taylor's hypothesis, as expected, shows increasing deviation further away from the center axis where the turbulence intensity grows rapidly. Interpretation of first- and second-order statistics including different kinds of spectral estimates are discussed in a related talk by P Buchhave.

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