

Abstract Submitted
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An elliptical model for space-time correlations in turbulent shear flows GUO-WEI HE, JIN-BAI ZHANG, LNM, Institute of Mechanics, Chinese Academy of Sciences — An ellipse model for space-time correlations in turbulent shear flows is developed upon a second order approximation to the correlation contours, while Taylor's hypothesis implies a first order approximation. It suggests that the space-time correlations are mainly determined by their space correlations and two characteristic velocities: propagation velocity and sweeping velocity. If the two characteristic velocities are equal, Taylor's model for weak shear rate is obtained; if the propagation velocity vanishes, Kraichnan's model for isotropic turbulence is recovered. The data from the direct numerical simulation of turbulent channel flows supports the model: the normalization of time axis in terms of the ellipse model causes the good collapse of the all space-time correlations.

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