Abstract Submitted
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Representation of Two-Point Velocity Correlations in Terms of Structure Tensors[1] A. BHATTACHARYA, U. GODSE, R.D. MOSER, S. KASSINOS — A general representation of the homogeneous, anisotropic two-point second-order correlation of turbulent velocity fluctuation of the form $R_{ij} = \langle u_i'(\mathbf{x})\mathbf{u_j'}(\mathbf{x}+\mathbf{r})\rangle = \mathbf{\Sigma_n f^{(n)}}(\mathbf{r})\mathbf{T_{ij}^{(n)}}$ is constructed, where 12 basis tensors $T_{ij}^{(n)}$ are expressed in terms of the separation vector $\mathbf{r}$ and structure tensors introduced by Kassinos and Reynolds (1995). The structure tensors are one-point correlations of the derivatives of fluctuating streamfunctions and are given by componentality b_{ij}, dimensionality y_{ij} and stropholysis Q_{ijk}. These tensors are shown to contain information about the anisotropy of R_{ij} (thus motivating such a representation). Using continuity and an additional constraint, only four scalar functions $f^{(n)}$ are shown to remain linearly independent. A comparison of the representation with two-point correlation data from DNS of channel flow turbulence is made in order to assess the suitability of this representation.

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