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**Scaling of the mean length of streamline segments in various turbulent flows** PHILIP SCHÄFER, MARKUS GAMPERT, JONAS BOSCHUNG, NORBERT PETERS, RWTH Aachen University — Streamlines constitute natural geometries in turbulent flow fields. The latter can be partitioned into segments based on the zero crossings of the gradient of the absolute value of the velocity field along the streamline. Streamline segments can further be characterized by the sign of the gradient of the absolute value into positive and negative ones. Then, most of the statistical properties of streamline segments are captured in the joint probability density function of the arclength between and the velocity difference at the ending points. An analysis based on a model equation for the length distribution of streamline segments and the characteristic size of extreme points of the absolute value of the velocity field along the streamline yields that the mean length of the latter should scale with the geometrical mean of the Kolmogorov microscale and the Taylor microscale. This theoretical prediction is confirmed based on four different direct numerical simulations of turbulent flow fields with Taylor based Reynolds numbers ranging from $50 - 300$. The database consists of two homogeneous isotropic decaying and one forced field. Furthermore, the case of a homogeneous shear flow is investigated.

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