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Local behavior of streamlines in turbulent flows JONAS BOSCHUNG, FABIAN HENNIG, NORBERT PETERS, Institute for Combustion Technology, RWTH Aachen University — Although streamlines have often been used mainly to visualize flow fields, they have been studied in recent years to some extent in the search for a better, more intuitive description and decomposition of the flow field. Streamlines seem a good candidate, as they are tangential to the velocity field and thus are prescribed by its structure. Similarly to the Q - R -classification of flow topologies, it is possible to classify the behavior of streamlines in an absolute sense by the unit vector gradient tensor and its first and second invariant H and K . The invariants are found to have a physical interpretation, inasmuch as they are a measure for the local net convergence or divergence of the streamlines and its rate of change, respectively. The joint pdf of H and K is evaluated for different Reynolds-numbers from 119 to 330. It is found that streamlines expand rapidly while shrinking gently. As the local flow behavior is determined by the invariants, several quantities are conditioned on H and K in order to relate them to the structure of the flow.

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