

Abstract Submitted  
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**Irreversibility and small-scale generation in 3-dimensional turbulent flows** ALAIN PUMIR, Ecole Normale Supérieure de Lyon and CNRS, HAITAO XU, Tsinghua University, Beijing, China, RAINER GRAUER, Ruhr University Bochum, Germany., EBERHARD BODENSCHATZ<sup>1</sup>, Max-Planck-Institute for Dynamics and self-organisation, Goettingen, Germany. — In 3-dimensional turbulent flows, the irreversibility of turbulence manifests itself by an asymmetry of the probability distribution of the instantaneous power  $p$  of the forces acting on fluid elements: the third moment of  $p$  was found to be negative. Here, I will discuss the relation between this negative third moment and vortex stretching, which is traditionally related to the generation of small scales. The construction is based on a decomposition of the power  $p$  as a sum of a local contribution, due to the variation of velocity at a fixed point in space, plus a convective part, due to the displacement of particles in the flow. The third moment of the latter term, which dominates the statistics, is explicitly expressed in terms of vortex stretching,

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