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Lagrangian statistics and flow topology in resistive drift-wave turbulence B. KADOCH, CNRS & CMI, Universite d'Aix-Marseille, France, D. DEL-CASTILLO-NEGRETE, Oak Ridge National Laboratory, USA, W.J.T. BOS, CNRS, Ecole Centrale de Lyon, France, K. SCHNEIDER, CNRS & CMI, Universite d'Aix-Marseille, France — A study of the relationship between Lagrangian statistics and flow topology in drift-wave turbulence is presented. The topology is characterized using the Weiss criterion, which provides a conceptually simple tool to partition the flow into topologically different regions. The turbulence model is based on the Hasegawa-Wakatani system, which is one of the simplest models of cross-field transport by electrostatic drift waves. The study is carried out for different values of the adiabaticity parameter c, in the Hasegawa-Wakatani model. In the $c >> 1$ adiabatic limit, the model reduces to a Hasegawa-Mima type equation, and for $c << 1$, the system reduces to a Navier-Stokes type equation. We follow a Lagrangian approach and perform the statistics on ensembles of tracers. The probability density functions (pdfs) of residence time in the topologically different regions are computed using the Lagrangian Weiss field, i.e., the Weiss field along the particles trajectories. In elliptic and hyperbolic regions, the pdfs of the residence time have self-similar algebraic decaying tails. In contrast, in the intermediate regions the pdf has exponential decaying tails. The conditional pdfs (with respect to the flow topology) of the Lagrangian velocity and acceleration are also computed.

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