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Non-diffusive turbulent transport of impurities in fusion plasmas S. FUTATANI, ITER Organization, France, D. DEL-CASTILLO-NEGRETE, Oak Ridge National Laboratory, USA, X. GARBET, CEA, IRFM, France, S. BENKADDA, N. DUBUIT, International Institude for Fusion Science - Universite de Provence, France — Non-diffusive impurity transport in tokamak plasmas is investigated using a three-dimensional fluid global code. The impurities are treated as an active scalar and the self-consistent interaction between the impurity concentration and the turbulence is studied. It is shown that the impurity concentration triggers intermittency that gives rise to a transition from Gaussian to stretched-exponential probability density functions of the $\mathbf{E} \times \mathbf{B}$ fluctuations. Proper orthogonal decomposition methods are used to unveil the multiscale spatio-temporal dynamics of the impurity concentration, the turbulence fluctuations, and the ion thermal flux. Spatio-temporal flux-gradient cross correlation functions are used to characterize the level of non-diffusive transport in the system. A novel diagnostic based on the use of Fourier-Laplace transforms is proposed and implemented to characterize the level of non-locality in space and time.

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