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Fractal ideas and percolation scalings for turbulent transport OLEG BAKUNIN, Physics and Astronomy, Kansas University — The essential deviation of transport processes in turbulent fluids and plasma from the classical behavior leads to the necessity of search for new approaches and scaling laws [1]. A variety of turbulence forms requires not only special description methods, but also an analysis of general mechanisms for different turbulence types. One such mechanism is the percolation transport [1,2]. Its description is based on the idea of long-range correlations, borrowed from theory of phase transitions and critical phenomena. The present paper considers the influence of zonal flow and time-dependence effects on the passive scalar behavior in the framework of the percolation approach. It is suggested to modify the renormalization condition of the small parameter of percolation model in accordance with the additional external influences superimposed on the system [3-4]. This approach makes it possible to consider simultaneously both parameters: the characteristic drift velocity U_d and the characteristic perturbation frequency w. The effective diffusion coefficient $D_{\text{eff}} \sim w^{7/10}$ satisfactory describes the low-frequency region w in which the long-range correlation effects play a significant role. This scaling agrees well with the analogous expressions that describe low frequency regimes of transport [1,2]. [1] Isichenko M B 1992 *Rev. Mod. Phys.* 64 961 [2] Bakunin O G 2004 *Reports on Progress in Physics* **67** 965 [3] Bakunin O G 2005 *Physica* A **345** 1 [4] Bakunin O G 2005 *J. Plasma Physics* **71** 756.

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