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The Role of Walls in Chaotic Mixing: Experimental Results JEAN-LUC THIFFEAULT, University of Wisconsin, Madison, EMMANUELLE GOUILLART, OLIVIER DAUCHOT, Service de Physique de l'Etat Condense, DSM, CEA Saclay, France, STEPHANE ROUX, Surface du Verre et Interfaces, UMR CNRS/Saint-Gobain, France — We report on experiments of chaotic mixing in a closed vessel, in which a highly viscous fluid is stirred by a moving rod. We analyze quantitatively how the concentration field of a low-diffusivity dye relaxes towards homogeneity, and observe a slow algebraic decay of the inhomogeneity, at odds with the exponential decay predicted by most previous studies. Visual observations reveal the dominant role of the vessel wall, which strongly influences the concentration field in the entire domain and causes the anomalous scaling. A simplified 1-D model supports our experimental results. Quantitative analysis of the concentration pattern leads to scalings for the distributions and the variance of the concentration field consistent with experimental and numerical results. (Physical Review Letters, in press. http://arxiv.org/abs/cond-mat/0612557)

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