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Mixing efficiency in two-dimensional turbulent and chaotic flows BENJAMIN KADOCH, IUSTI-CNRS, Aix-Marseille University, Marseille, France, WOUTER BOS, LMFA-CNRS, Ecole Centrale de Lyon, Université de Lyon, Ecully, France, KAI SCHNEIDER, M2P2-CNRS & CMI Aix-Marseille University, Marseille, France — We investigate the mixing in a flow generated by a circular rod, describing a figure-eight-shaped motion in a two-dimensional circular vessel. The vessel, the moving rod, and the equations of motion are modeled using a volume penalization method imbedded in a classical Fourier pseudo-spectral code as described in [1]. The influence of the Peclet number on the mixing efficiency is measured for different Stokes and turbulent regimes. Here, the mixing efficiency is measured by evaluating the decay of passive scalar fluctuations for a given energy injection rate. The Stokes regime shows results similar to the ones obtained in [2] for chaotic mixing. For instance, the passive scalar variance decays following a powerlaw, related to the presence of unmixed fluid near the fixed walls, which acts as a reservoir for the mixing away from the wall. For the turbulent regimes, however, the detachment of vorticity in the boundary layer more efficiently injects the unmixed fluid into the domain.

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[2] E. Gouillart, O. Dauchot, B. Dubrulle, S S. Roux, and J.-L. Thiffeault. Phys. Rev. E $78,\,026211,\,2008$

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