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Exploiting numerical diffusion to study transport and chaotic mixing for extremely large Péclet values PATRICK ANDERSON, MASSIMILANO GIONA[1], OLEKSANDR GORODETSKYI, TU Eindhoven — We show that the purely convective mapping matrix approach provides an extremely versatile tool to study advection-diffusion processes for extremely large Péclet values (∼108 and higher). This is made possible due to the coarse-grained approximation that introduces numerical diffusion, the intensity of which depends in a simple way on grid resolution. This observation permits to address fundamental physical issues associated with chaotic mixing in the presence of diffusion. Specifically, we show that in partially chaotic flows, the dominant decay exponent of the advection diffusion propagator will eventually decay as Pe-1 in the presence of quasiperiodic regions of finite measure, no matter how small they are. Examples of 2d and 3d partially chaotic flows are discussed.

[1]Sabbatical visitor from La Sapienza Università di Roma

Patrick Anderson
TU Eindhoven

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