Control and mixing for 2D Navier–Stokes equations with space-time localised force

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We consider 2D Navie–Stokes equations in a bounded domain with smooth boundary and discuss the interconnection between controllability for the deterministic problem and mixing properties of the associated random dynamics. Namely, we first consider the problem of stabilisation of a given non-stationary solution, assuming that the control is localised in space and time and is finite-dimensional as a function of both variables. We next replace the control by a random force and prove that the resulting random dynamical system is exponentially mixing in the Kantorovich–Wasserstein distance. Some of the results of this talk are obtained in collaboration with V. Barbu and S. Rodrigues.