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SPECIAL FEATURES IN TURBULENT MIXING. COMPARISON BETWEEN PERIODIC AND NON PERIODIC CASE

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Abstract. After hundreds of years of stability study, the problems of flow kinematics are far from complete solving. A modern theory appears in this field: the mixing theory. Its mathematical methods and techniques developed the significant relation between turbulence and chaos. The turbulence is an important feature of dynamic systems with few freedom degrees, the so-called "far from equilibrium systems". These are widespread between the models of excitable media.

Studying a mixing for a flow implies the analysis of successive stretching and folding phenomena for its particles, the influence of parameters and initial conditions. In the previous works, the study of the 3D non-periodic models exhibited a quite complicated behavior, involving some significant events - the so-called "rare events". The variation of parameters had a great influence on the length and surface deformations. The 2D (periodic) case is simpler, but significant events can also issue for irrational values of the length and surface versors, as was the situation in 3D case.

The comparison between 2D and 3D case revealed interesting properties; therefore a modified 2D (periodic) model is tested. The numerical simulations were realized in MapleVI, for searching special mathematical events. Continuing this work both from analytical and numeric standpoint would relieve useful properties for the turbulent mixing. A proximal target is to test some special functions for the periodic model, and to study the behavior of the structures realized by the model.

Full text

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