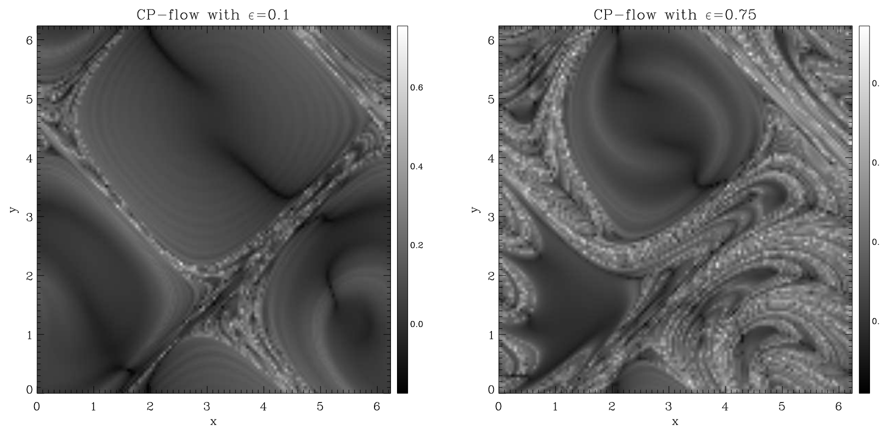

Figure 1: Finite time Lyapunov exponents calculated in the Galloway-Proctor flow $\mathbf{u}(x, y, t) = (\partial_y \psi, -\partial_x \psi, \psi)$ with $\psi(x, y, t) = \sqrt{3/2}\,(\cos(x + \epsilon \cos t) + \sin(x + \epsilon \sin t))$ for $\epsilon = 0.1$ (left) and $\epsilon = 0.75$ (right).

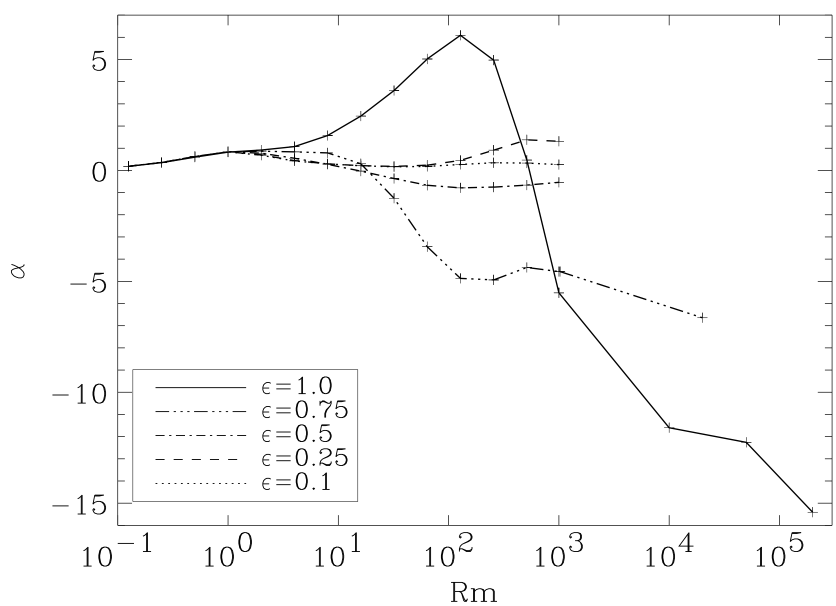

Figure 2: α-effect versus Rm for the GP-flow for different values of ϵ.

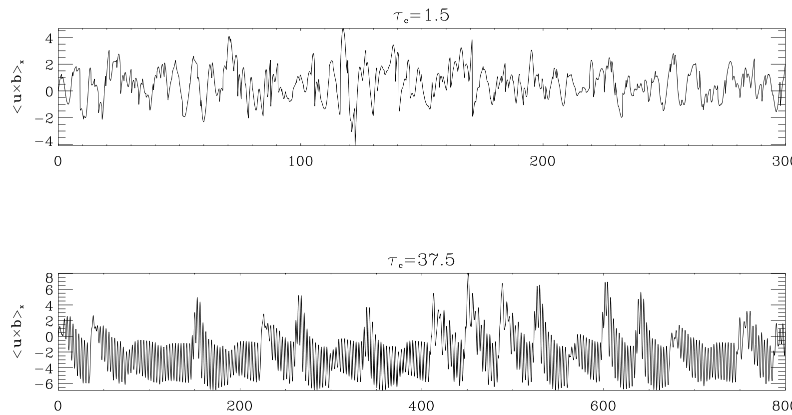

Figure 3: Timeseries of the space-averaged x-component of the emf for the time-decorrelated GP-flow ($\psi(x,y,t) = \sqrt{3/2}\,(\cos(x+\epsilon\cos(t+\phi(t))) + \sin(x+\epsilon\sin(t+\phi(t))))$, ϕ changes every τ_c).

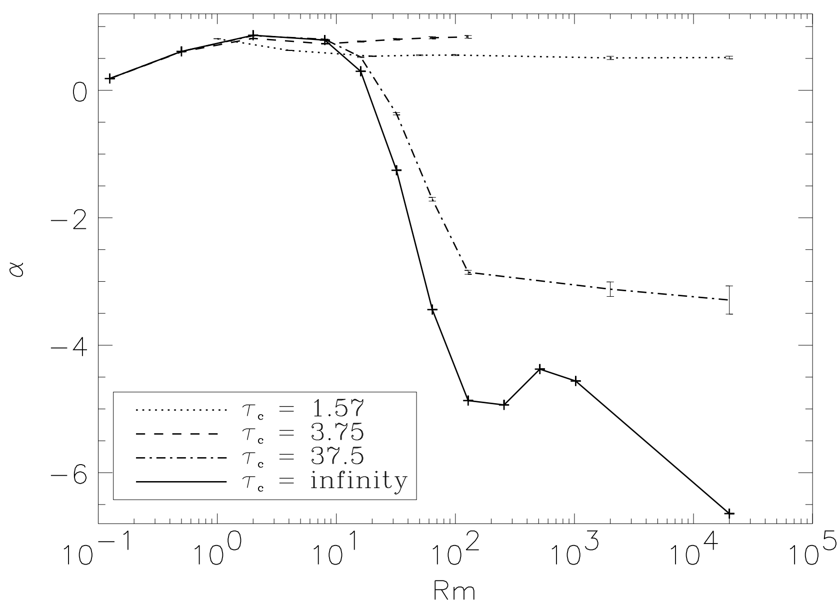

Figure 4: α-effect versus Rm for the time decorrelated Galloway-Proctor flow for different values of τ_c; $\epsilon = 0.75$.

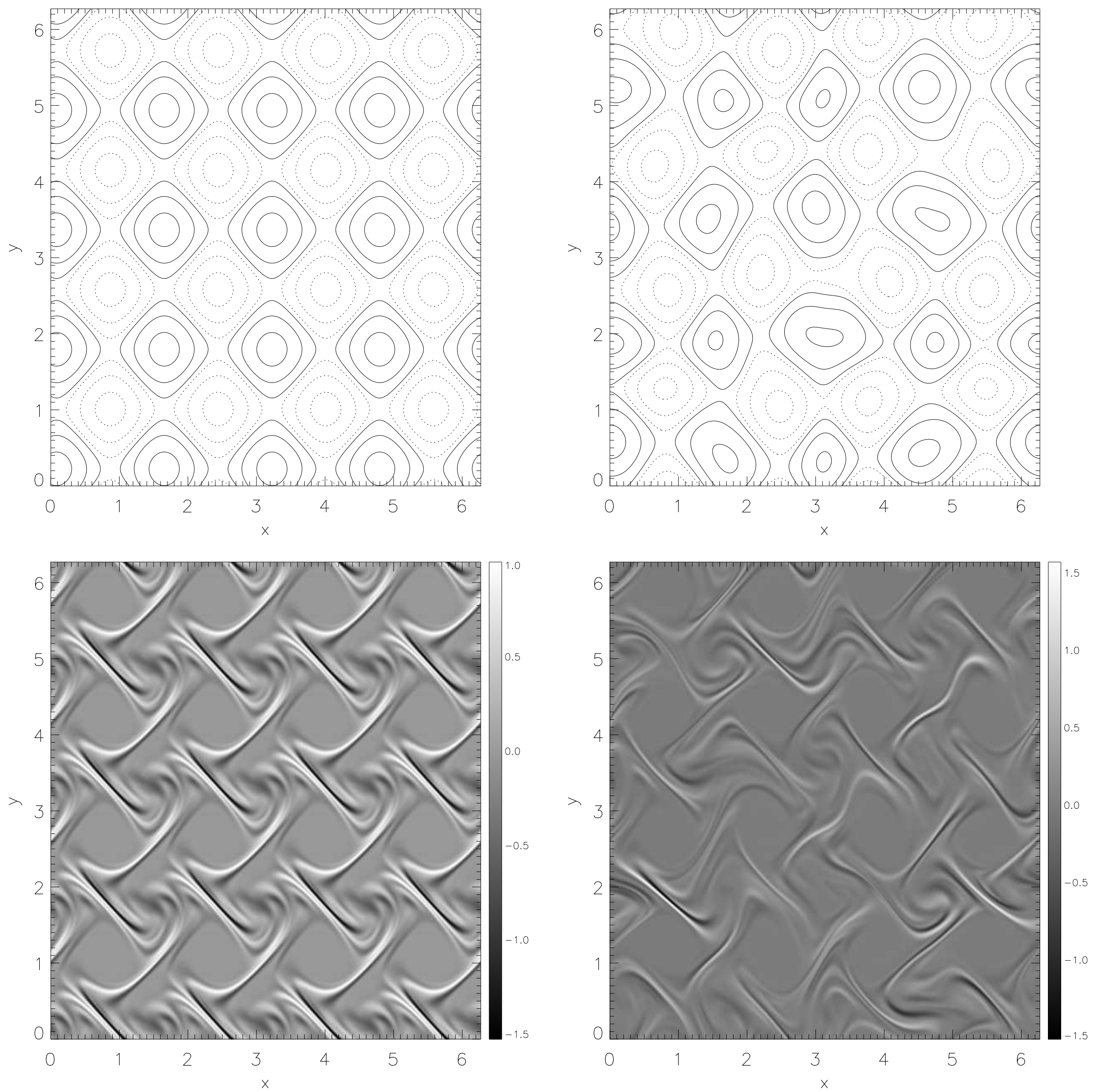

Figure 5: Streamfunctions (top) and x-components of the magnetic field (bottom) in the GP-flow (left) and in the spatially decorrelated GP-flow (right).

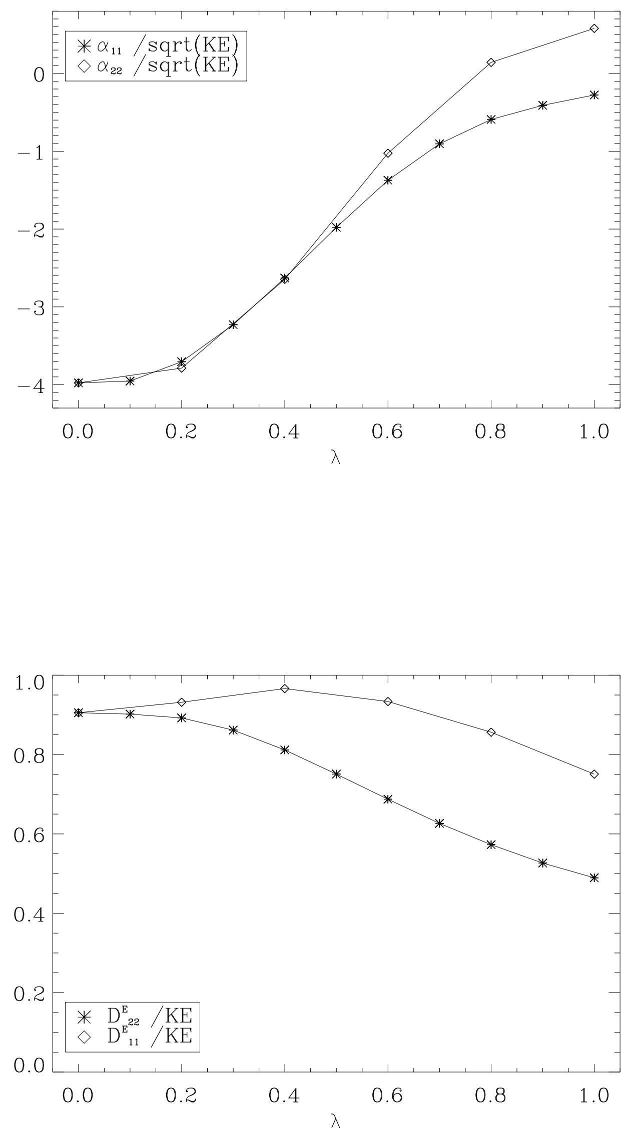

Figure 6: α-effect (top) and scalar turbulent diffusion (bottom) in the spatially decorrelated GP-flow for $Rm = 128$; the parameter λ corresponds to the variance of the phases distribution, increasing λ increases the spatial randomness of the flow.

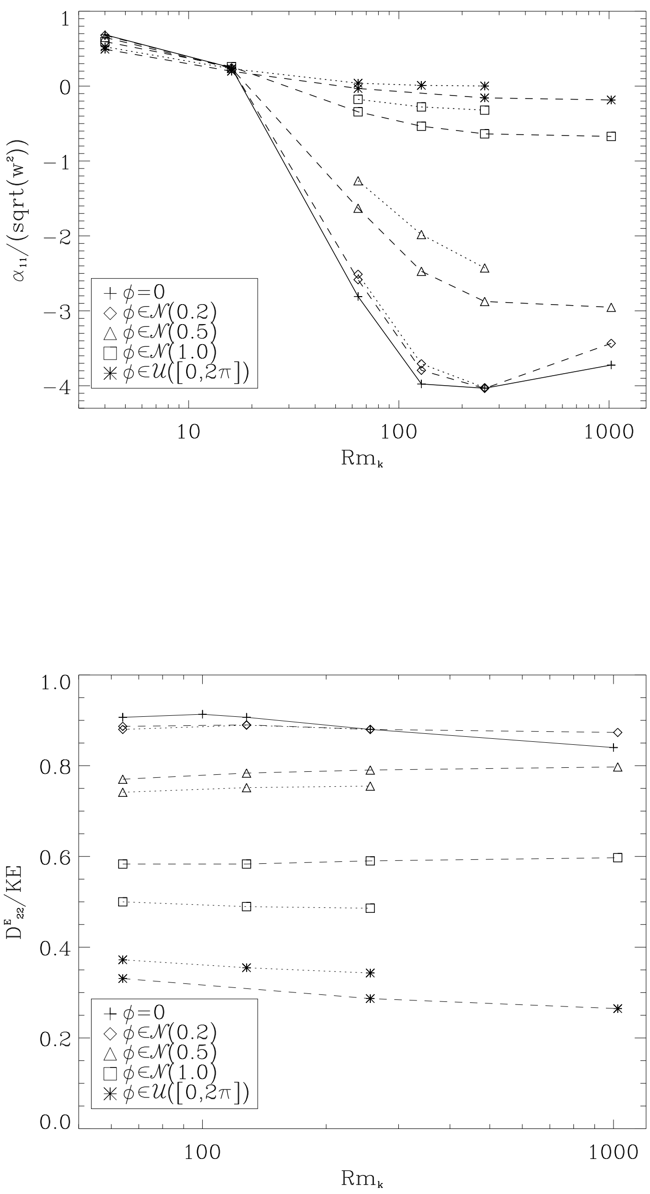

Figure 7: α-effect (top) and scalar turbulent diffusion (bottom) versus Rm in the spatially decorrelated GP-flow for different phases distributions.

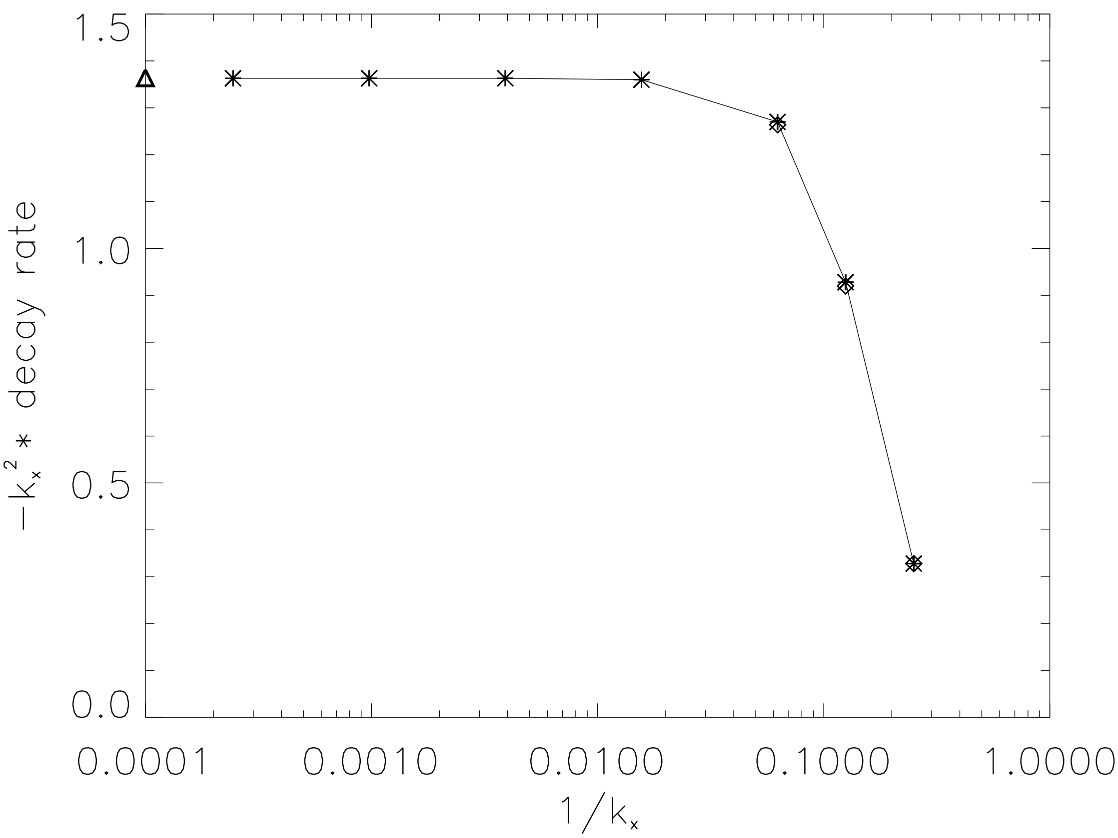

Figure 8: Scalar turbulent diffusion measured by imposing a mean gradient ($\triangle$), by measuring the decay rate of the largest scale mode in a computing box ($\diamond$), by measuring the decay rate of modes of the form $a\,e^{i\mathbf{k}\cdot\mathbf{x}}$ ($\star$). The horizontal axis shows the ratio between the scale of the flow and the largest scale scalar mode, the $\triangle$, which corresponds to the limit of a uniform mean gradient has been placed arbitrarily; $Rm = 64$ at the scale of the flow.