Erratum: Spatiotemporal perspective on the decay of turbulence in wall-bounded flows [Phys. Rev. E 79, 025301 (2009)]

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An incorrect implementation of the procedure intended to smooth the tail of the size distribution probability of the laminar domains led to a spurious shift of the exponents of the apparent power laws $\Pi(S) \sim S^{-\alpha}$ observed, i.e., α now of the order of 3 instead of 2 previously. The corrected version of Fig. 3 is given below. The inset of that figure has been replaced by a representation of the same data better revealing the trends.

The main conclusion that, in a spatiotemporal perspective, turbulence can effectively be sustained indefinitely above some given value R_{low}, *whether or not the local lifetime, as obtained from the low-dimensional dynamical systems theory, diverges for* $R_{\mathrm{low}} < R < \infty$, remains of course valid but the argument need to be adapted.

While the first momentum of the distribution of laminar domain sizes, $\langle S \rangle = \int_{S_{\min}}^{\infty} S\Pi(S)\mathrm{d}S$, now remains defined, its second moment, $\langle S^2 \rangle = \int_{S_{\min}}^{\infty} S^2\Pi(S)\mathrm{d}S$, may diverge depending on whether or not the exponents α of the tails of the distributions are smaller or larger than 3. From the nucleation viewpoint, the divergence of the variance is in fact more meaningful than the divergence of the mean (erroneously) claimed earlier. Distributions of laminar domain sizes can be defined on time scales much longer than those of turbulent pattern renewal. If a laminar germ grows without bounds when it is larger than some critical size and recedes otherwise, then, as long as the variance remains somewhat smaller than the critical germ size, the probability of occurrence of a critical germ is negligible and turbulence remains sustained ($R=171.5$, $\alpha \simeq 3.4$). When the variance diverge, a critical germ, whatever its size, will appear with finite probability and next will invade the system: turbulence is bound to decay ($R=171$, $\alpha \simeq 2.8$). The change of behavior is expected for $171.5 > R > 171$ in our model and is conjectured to take place at $R \sim 325$ in Couette flow as reported by Bottin *et al.*, despite the reinterpretation of experimental data by Hof *et al.* A specific study of the nucleation of laminar domains in large aspect ratio systems, using the model, is in progress.

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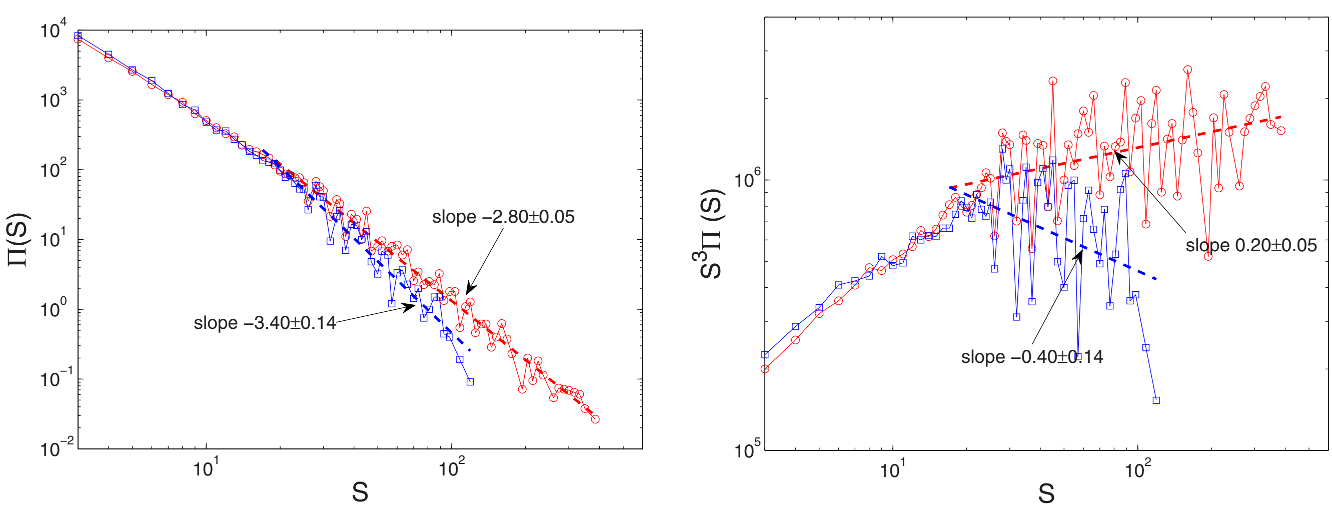

FIG. 3. (Color online) Left: Probability distribution of cluster areas $\Pi(S)$ as a function of the surface S (numbers of laminar pixels). Right: $S^3\Pi(S)$ as a function of S. $R=171.5$: blue squares. $R=171$: red circles.

