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Exit times in non-linear dynamical systems subject to non-Gaussian forcing

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We consider a non-linear dynamical system $dX_t^\varepsilon = -U'(X_t^\varepsilon)dt + \varepsilon dL_t$ which can be seen as a deterministic system $dX_t^0 = -U'(X_t^0)dt$ perturbed by a non-Gaussian Lévy noise L of small amplitude ε.

We study the mean exit times of X^ε from an interval containing a unique asymptotically stable attractor of X^0 in dependence on the weight of the big jumps of the forcing L. In particular, we consider heavy-tailed jumps (Lévy flights and weakly tempered Lévy flights), sub-exponential light jumps and super-exponential ultralight jumps.

In all cases including the super-exponential case, the exit times are essentially shorter than the Kramers times characteristic for the Gaussian forcing.