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Moment estimates for solutions of SPDEs with Lévy colored noise

In this talk, I introduce a class of processes that can be used as noise for stochastic partial differential equations (SPDEs). This noise is called the *Lévy colored noise*, and is constructed from a Lévy white noise using the convolution with a suitable spatial kernel. We assume that the Lévy measure of the noise has finite variance. Therefore, the stochastic integral with respect to this noise is constructed similarly to the integral with respect to the spatially-homogeneous Gaussian case considered in Dalang (1999). Using Rosenthal's inequality, we provide an upper bound for the p-th moment of the stochastic integral with respect to this noise, which allows us to identify sufficient conditions for the solution of an SPDE driven by this noise to have higher order moments. We first analyze this question for the linear SPDE (in which the noise enters in an additive way), considering as examples the stochastic heat and wave equations. We present a general theory for a non-linear SPDE with Lipschitz coefficients, and perform a detailed analysis in the case of the heat equation (in dimension $d \geq 1$), and wave equation (in dimension $d \leq 3$). We show that the solution of each of these equations has a finite upper Lyapounov exponent of order $p \geq 2$, and in some cases, is weakly intermittent. In the case of the parabolic/hyperbolic Anderson model, we provide the Poisson chaos expansion of the solution, and compute the second-order upper Lyapounov exponent. This talk is based on joint work with Juan Jiménez.