Computational mean-square stability analysis for linear systems of SODEs

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We consider the mean-square stability analysis for linear SODEs from a computational point of view. The criteria for deciding whether the equilibrium solution of a linear system of SODEs is stable or unstable in the mean-square sense, is theoretically well understood. However, the numerical simulations obtained by Monte-Carlo techniques are strongly influenced by the pathwise behaviour of the numerical trajectories. In the case of almost sure stable but mean-square unstable systems, the mean-square instability depends on very rare exploding trajectories which renders the computational cost of the standard Monte-Carlo approach prohibitively high. We will illustrate this behaviour by numerical studies for linear SODE systems obtained e.g. by the spatial discretisation of SPDEs. This talk is based on a joint work with M. Ableidinger and E. Buckwar and is connected with the talk *Variance reduction techniques for the numerical simulation of the stochastic heat equation* by M. Ableidinger, where the numerical simulation of the spatially discretised stochastic heat equation is treated.