

Hitting probabilities for systems of stochastic partial differential equations

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Abstract. We consider an R^d -valued random field that solves a possibly non-linear system of stochastic partial differential equations, such as stochastic heat or wave equations. We present results on upper and lower bounds on the probabilities that the random field visits a deterministic subset of R^d . These bounds are given by geometric quantities, which make precise the statement that “large” sets are hit with positive probability and “small” sets are hit with probability zero. These bounds also determine the critical dimension above which points are polar (that is, are hit with probability zero), but do not, in general, determine whether points are polar in the critical dimension. For linear spde’s, we resolve, in joint work with Carl Mueller and Yimin Xiao, the issue of polarity of points in the critical dimension, and also address the question of existence of multiple points in critical dimensions.

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