

Applications of controlled functions to stochastic PDEs.

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Controlled functions are functions which 'looks like' a given set of well understood basic objects. We will show how the idea of controlled function can be used in a variety of problems related to differential equations (ordinary or partial) in presence of noise mixing functional analysis and probability in new ways. We will start by reviewing the controlled path approach to differential equations driven by rough paths in order to introduce the idea in a familiar setting. Then we will go on to analyse some problems in random PDEs: the linear transport equation driven by a rough path and the energy solutions to the KPZ equation. Finally we will introduce the paracontrolled approach to singular stochastic PDEs and analyse in detail the case of the KPZ equation.