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A Study of Non Linear Partial Differential Equation with Random Initial Condition

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Abstract : In this work, we present the effect of noise on the solution of a partial differential equation (PDE) in three different setting. We shall first consider random initial condition for two nonlinear dispersive PDE the non linear Schrodinger equation and the Kortteweg –de vries equation and analyse their effect on some special solution , the soliton solutions.The second case considered a linear partial differential equation , the wave equation with random initial conditions allow to substantially decrease the computational and data storage costs of an algorithm to solve the inverse problem based on the boundary measurements of the solution of this equation. Finally, the third example considered is that of the linear transport equation with a singular drift term, when we shall show that the addition of a multiplicative noise term forbids the blow up of solutions under a very weak hypothesis for which we have finite time blow up of a solution in the deterministic case. Here we consider the problem of wave propagation, which is modelled by a nonlinear dispersive equation with noisy initial condition .As observed noise can also be introduced directly in the equations.

Keywords : drift term, finite time blow up, inverse problem, soliton solution
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