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Numerical methods for stochastic parabolic PDEs. (English) Zbl 0919.65100

Numer. Funct. Anal. Optimization 20, No. 1-2, 121-145 (1999).

This paper presents a proof of the convergence of finite difference approximations of the solution of the nonlinear stochastic partial differential equation initial value problem of the form

$$du(t) = \left[\frac{\partial^2 u(t)}{\partial x^2} + f(u(t))\right]dt + dB(t), \quad u(0) = U,$$

where $B(t)$ is a Wiener process. It concludes with a brief summary of results obtained in numerical experiments with $f = 0$ and with $f = .5(u - u^3)$.

Reviewer: M.D.Lax (Long Beach)

MSC:

65C99 Probabilistic methods, stochastic differential equations
35K55 Nonlinear parabolic equations
65M06 Finite difference methods for initial value and initial-boundary value problems involving PDEs
60H15 Stochastic partial differential equations (aspects of stochastic analysis)
35R60 PDEs with randomness, stochastic partial differential equations
65M12 Stability and convergence of numerical methods for initial value and initial-boundary value problems involving PDEs

Keywords:

convergence; finite difference; nonlinear stochastic partial differential equation; initial value problem; Wiener process; numerical experiments

Full Text: DOI

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