

NUMERICAL APPROXIMATIONS FOR SOME FRACTIONAL
STOCHASTIC PARTIAL DIFFERENTIAL EQUATIONS

Latifa Debbi¹, Zineb Arab²

¹*Laboratory of Pure and Applied Mathematics, Faculty of Sciences,
University Ferhat Abbas, El-Maabouda Setif 19000 & University of M'sila,
Algeria.*

²*Department of Mathematics, Faculty of sciences, University El-Hadj
Lakhdher, Batna 05000, Algeria. & Laboratory of Pure and Applied
Mathematics, Faculty of Sciences, University Ferhat Abbas, El-Maabouda
Setif 19000, Algeria.*

Abstract

In this work, we elaborate and calculate the rate of convergence of several numerical schemes to approximate the solution of some fractional stochastic partial differential equations (FSPDEs); fractional stochastic heat and Burgers equations with gaussian multiplicative noise. In particular, we use Galerkin spectral method in space, Euler method in time and we elaborate a complete scheme. We prove strong convergence and we calculate explicitly the rate of convergence and show its dependence on the fractional power of the Laplacian.

Keywords: Strong convergence, Galerkin spectral method, implicit Euler scheme, multiplicative noise, fractional laplacian, Burgers equation

¹First Author's e-mail: ldebbi@yahoo.fr

²Second Author's e-mail: zinebarab@yahoo.com