Topological Methods in Nonlinear Analysis
Volume 53, No. 2, 2019, 659–682
DOI: 10.12775/TMNA.2019.015

STRONG CONVERGENCE OF BI-SPATIAL RANDOM ATTRACTORS FOR PARABOLIC EQUATIONS ON THIN DOMAINS WITH ROUGH NOISE

Fuzhi Li — Yangrong Li — Renhai Wang

Abstract. This article concerns bi-spatial random dynamics for the stochastic reaction-diffusion equation on a thin domain, where the noise is described by a general stochastic process instead of the usual Wiener process. A bi-spatial attractor is obtained when the non-initial state space is the p-times Lebesgue space, meanwhile, measurability of the attractor in the Banach space is proved by using measurability of both cocycle and absorbing set. Finally, the p-norm convergence of attractors is obtained when the thin domain collapses onto a lower dimensional domain. The method of symbolical truncation is applied to provide some uniformly asymptotic estimates.

1. Introduction

The subject of a thin domain problem is to consider both existence and convergence of an attractor when the equation is defined on a thin domain, which collapses onto a lower dimensional domain. Some pioneered works were given by Hale, Raugel and Sell (see [16], [31]), with notable developments for a large number of (deterministic) dissipative equations (see [1], [3], [4], [14], [19], [30], and the references therein).

2010 *Mathematics Subject Classification.* Primary: 35B40; Secondary: 37L55, 60H15.

Key words and phrases. Bi-spatial random attractor; stochastic reaction-diffusion equation; rough noise; thin domain; strong semi-continuity; regularity; symbolical truncation.

This work was funded by National Natural Science Foundation of China grant 11571283.