UNIFORM ATTRACTORS FOR THE NON-AUTONOMOUS PARABOLIC EQUATION WITH NONLINEAR LAPLACIAN PRINCIPAL PART IN UNBOUNDED DOMAIN

GUANG-XIA CHEN

Abstract. In this paper, we are concerned with the asymptotic behavior of the solution for the non-autonomous parabolic equation with nonlinear Laplacian principal part in \mathbb{R}^n . The existence of the $(L^2(\mathbb{R}^n), L^2(\mathbb{R}^n))$ -uniform attractor, the $(L^2(\mathbb{R}^n), L^p(\mathbb{R}^n))$ -uniform attractor and the $(L^2(\mathbb{R}^n), W^{1,p}(\mathbb{R}^n)) \cap L^q(\mathbb{R}^n))$ -uniform attractor will be proved.

Mathematics subject classification (2010): 35B40, 35B41, 35L70. Keywords and phrases: uniform attractor, unbounded domain.

REFERENCES

- A. V. BABIN AND M. I. VISHIK, Attractors of differential evolution equation in unbounded domain, Proc. Roy. Soc. Edinburgh Sect. A, 116 (1990), 221–243.
- [2] A. V. BABIN AND M. I. VISHIK, Attractors of evolution equations, North-Holland, Amsterdam, 1992.
- [3] A. RODRIGUEZ-BERNAL AND B. WANG, Attractors for partly dissipative reaction diffusion equation systems in \mathbb{R}^n , J. Math. Anal. Appl., **252** (2000), 790–803.
- [4] V. V. CHEPYZHOV AND M. I. VISHIK, Attractors for Equation of Mathematical Physics, American Mathematical Society, Providence, Rhode Island, 2002.
- [5] A. N. CARVALHO AND C. B. GENTILE, Asymptotic behaviour of nonlinear parabolic equations with monotone principal part, J. Math. Anal. Appl., 280 (2003), 252–272.
- [6] J. W. CHOLEWA AND T. DLOTKO, Global attractors in abstract parabolic problems, Cambridge University Press, 2000.
- [7] D. N. CHEBAN, P. E. KLOEDEN, B. SCHMALFUSS, The relationship between pullback, forward and global attractors of non-autonomous dynamical systems, Nonlinear Dyn. Syst. Theory, 2 (2002), 9–28.
- [8] E. FEIREISL, PH. LAURENCOT, F. SIMONDON, H. TOURE, Compact attractors for reaction-diffusion equation in \mathbb{R}^n , C. R. Acad. Sci. Paris. Sér. I Math., **319** (1994), 147–151.
- [9] E. FEIREISL, PH. LAURENCOT AND F. SIMONDON, Compact attractor for degenerate parabolic equation in \mathbb{R}^n , C. R. Acad. Sci. Paris. Sér. I Math., **320** (1995), 1079–1083.
- [10] E. FEIREISL, PH. LAURENCOT AND F. SIMONDON, Global attractors for degenerate parabolic equation on unbounded domains, J. Differential Equations, 129 (1996), 239–261.
- [11] J. L. LIONS, Quelques Méthodes de Résolution des Problèmes aux Limites Non Linéaires, Dunod, Paris, 1969.
- [12] A. KH. KHANMANEDOV, Existence of a global attractor for the degenerate parabolic equation with p-Laplacian principal part in unbounded domain, J. Math. Anal. Appl., 316 (2006), 601–615.
- [13] CHUN-YOU SUN AND CHENG-KUI ZHONG, Attractor for semilinear reaction-diffusion equation with distribution derivatives in unbounded demains, Nonlinear Anal., 63 (2005), 49–65.
- [14] B.WANG, Attractors for reaction diffusion equation in unbounded domains, Phys. D, 128 (1999), 41–52.
- [15] MEI-HUA YANG, CHUN-YOU SUN AND CHENG-KUI ZHONG, Global attractor for p-Laplacian equation, J. Math. Anal. Appl., 327 (2007), 1130–1142.
- [16] MEI-HUA YANG, CHUN-YOU SUN AND CHENG-KUI ZHONG, Existence of a global attractor for a p-Laplacian equation in \mathbb{R}^n , Nonlinear Anal., **66** (2007), 1–13.

- [17] CHENG-KUI ZHONG, MEI-HUA YANG AND CHUN-YOU SUN, The existence of global attractors for the norm-to-weak continuous semigroup and application to the nonlinear reaction-diffusion equations, J. Differential Equations, 15 (2006), 367–399.
- [18] GUANG-XIA CHEN AND CHENG-KUI ZHONG, *Uniform attractor for non-autonomous p-Laplacian equation*, Nonlinear Anal., **68** (2008), 3349–3363.