Exit measure of Super-Brownian motion in random medium

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Abstract: This paper defines the exit measure of super-Brownian motion in random medium using the approximating methods developed by Le Gall and Mytnik(2005). The absolute continuity of the exit measure in dimension $d < 3$ is proved and the continuity of the density is established in dimension $d = 2$. The exit measure and the density are presented by stochastic integrals.

References

[1] D. A. Dawson (1993). *Measure-valued Markov processes,* Lecture Notes in Math. **1541** , 1–260.

[2] D. A. Dawson, Z. Li and H. Wang (2001). Superprocesses with dependent spatial motion and general branching densities, *Electron. J. Probab.* **6(25)**, 1–33.

[3] E. B. Dynkin (1991). A probabilistic approach to one class of nonlinear differential equations, *Probab. Th. Rel. Fields*, **89**, 89-115.

[4] Dynkin, E. B. (1993). Superprocesses and partial differential equations, *Ann. Probab.*, **21**: 1185-1262.

[5] J. F. Le Gall (1997). A probabilistic poisson representation for positive solutions $\Delta u = u^2$ in a plannar domain, *Comm. Pure Appl. Math.* **50**, 69–103.

[6] J. F. Le Gall and L. Mytnik (2005). Stochastic integral representation and regularity of the density for exit measure of super-Brownian motion, *Ann. Probab.* **33(1)**, 194–222.

[7] E. Perkins (2002).*Dawson-watanabe superprocesses and measure-valued diffusions.* Lecture Notes in Math., **1781**, 135-192, Springer-Verlag, Herdelberg.

[8] Y.-X. Ren (2000). Absolute continuities of exit measures for superdiffusions. *Science in China* (Series A) **43(5)** 449–457.

[9] Y.-X. Ren, R. Song and H. Wang (2007). A Class of Stochastic Partial Differential Equations for Interacting Superprocesses on a Bounded Domain, to appear in *Osaka J. Math.*

[10] Y.-C. Sheu (1996). On states of exit measures for superdiffusions. *Ann. Probab.* **24(1)** 268–279.

[11] J. B. Walsh (1986). *An introduction to stochastic partial differential equations,* Lecture Notes in Math. **1180**, 265–439.

[12] H. Wang (1997). State classification for a class of measure-valued branching diffusions in a Brownian medium, *Probab. Th. Rel. Fields* **109**, 39–55.

[13] H. Wang (1998). A class of measure-valued branching diffusions in a random medium, *Stoch. Anal. Appl.* **16(4)**, 753–786.