

A note on a.s. finiteness of perpetual integral functionals of difusions

Davar Khoshnevisan, *University of Utah, Utah, U.S.A.*
 Paavo Salminen, *Abo Akademi University, Abo, Finland*
 Marc Yor, *Universit'e Pierre et Marie Curie, Paris, France*

Abstract

In this note we use the boundary classification of diffusions in order to derive a criterion for the convergence of perpetual integral functionals of transient real-valued diffusions. We present a second approach, based on Khas'minskii's lemma, which is applicable also to spectrally negative Levy processes. In the particular case of transient Bessel processes, our criterion agrees with the one obtained via Jeulin's convergence lemma.

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Bibliography

1. Bertoin, Jean. Lévy processes. Cambridge Tracts in Mathematics, 121. Cambridge University Press, Cambridge, 1996. x+265 pp. ISBN: 0-521-56243-0 [MR1406564](#) (98e:60117)
2. Borodin, Andrei N.; Salminen, Paavo. Handbook of Brownian motion---facts and formulae. Second edition. Probability and its Applications. Birkhäuser Verlag, Basel, 2002. xvi+672 pp. ISBN: 3-7643-6705-9 [MR1912205](#) (2003g:60001)
3. Borodin, A. N.; Salminen, P.. On some exponential integral functionals of $\$rm BM(\mu)\$$ and $\$rm BES(3)\$$. *Zap. Nauchn. Sem. S.-Peterburg. Otdel. Mat. Inst. Steklov. (POMI)* 311 (2004), Veroyatn. i Stat. 7, 51--78, 298--299; translation in *J. Math. Sci. (N. Y.)* 133 (2006), no. 3, 1231--1248 [MR2092200](#) (2005h:60246)
4. Breiman, Leo. Probability. Addison-Wesley Publishing Company, Reading, Mass.-London-Don Mills, Ont. 1968 ix+421 pp. [MR0229267](#) (37 #4841)
5. Chung, Kai Lai; Zhao, Zhong Xin. From Brownian motion to Schrödinger's equation. Grundlehren der Mathematischen Wissenschaften [Fundamental Principles of Mathematical Sciences], 312. Springer-Verlag, Berlin, 1995. xii+287 pp. ISBN: 3-540-57030-6 [MR1329992](#) (96f:60140)
6. Dellacherie, Claude; Meyer, Paul-André. Probabilités et potentiel. (French) Chapitres I à IV. Édition entièrement refondue. Publications de l'Institut de Mathématique de l'Université de Strasbourg, No. XV. Actualités Scientifiques et Industrielles, No. 1372. Hermann, Paris, 1975. x+291 pp. [MR0488194](#) (58 #7757)
7. Dufresne, Daniel. The distribution of a perpetuity, with applications to risk theory and pension funding. *Scand. Actuar. J.* 1990, no. 1-2, 39--79. [MR1129194](#) (92i:62195)
8. Durrett, Richard. Probability. Theory and examples. The Wadsworth & Brooks/Cole Statistics/Probability Series. Wadsworth & Brooks/Cole Advanced Books & Software, Pacific Grove, CA, 1991. x+453 pp. ISBN: 0-534-13206-5 [MR1068527](#) (91m:60002)
9. Engelbert, H. J.; Senf, T. On functionals of a Wiener process with drift and exponential local martingales. *Stochastic processes and related topics (Georghthal, 1990)*, 45--58, Math. Res., 61, Akademie-Verlag, Berlin, 1991. [MR1127879](#) (92h:60072)
10. Erickson, K. Bruce; Maller, Ross A. Generalised Ornstein-Uhlenbeck processes and the convergence of Lévy integrals. *Séminaire de Probabilités XXXVIII*, 70--94, Lecture Notes in Math., 1857, Springer, Berlin, 2005.

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- [MR2126967](#) (2006b:60099)
11. Itô, Kiyosi; McKean, Henry P., Jr. Diffusion processes and their sample paths. Second printing, corrected. Die Grundlehren der mathematischen Wissenschaften, Band 125. *Springer-Verlag, Berlin-New York*, 1974. xv+321 pp. [MR0345224](#) (49 #9963)
 12. Jeulin, T. Sur la convergence absolue de certaines intégrales. (French) [On the absolute convergence of certain integrals] *Seminar on Probability, XVI*, pp. 248--256, Lecture Notes in Math., 920, *Springer, Berlin-New York*, 1982. [MR0658688](#) (84i:60047)
 13. Kallenberg, Olav. Foundations of modern probability. Probability and its Applications (New York). *Springer-Verlag, New York*, 1997. xii+523 pp. ISBN: 0-387-94957-7 [MR1464694](#) (99e:60001)
 14. Khasminskii, R. Z. On positive solutions of the equation $\{\text{cal U}\} + Vu = 0$. *Theor. Probability Appl.* 4 1959 309--318. [MR0123373](#) (23 #A700)P. Tetali. Random walks and the effective resistance of networks. *J. Theor. Prob.* 4 (1991), 101--109. [Math. Review 92c:60097](#)
 15. Matsumoto, Hiroyuki; Yor, Marc. Exponential functionals of Brownian motion. I. Probability laws at fixed time. *Probab. Surv.* 2 (2005), 312--347 (electronic). [MR2203675](#)
 16. Matsumoto, Hiroyuki; Yor, Marc. Exponential functionals of Brownian motion. II. Some related diffusion processes. *Probab. Surv.* 2 (2005), 348--384 (electronic). [MR2203676](#)
 17. Salminen, Paavo; Yor, Marc. Perpetual integral functionals as hitting and occupation times. *Electron. J. Probab.* 10 (2005), no. 11, 371--419 (electronic). [MR2147313](#) (2006a:60148)
 18. Salminen, Paavo; Yor, Marc. Properties of perpetual integral functionals of Brownian motion with drift. *Ann. Inst. H. Poincaré Probab. Statist.* 41 (2005), no. 3, 335--347. [MR2139023](#) (2006c:60096)
 19. Simon, Barry. Functional integration and quantum physics. Pure and Applied Mathematics, 86. *Academic Press, Inc. [Harcourt Brace Jovanovich, Publishers], New York-London*, 1979. ix+296 pp. ISBN: 0-12-644250-9 [MR0544188](#) (84m:81066)
 20. Stummer, W.; Sturm, K.-Th. On exponentials of additive functionals of Markov processes. *Stochastic Process. Appl.* 85 (2000), no. 1, 45--60. [MR1730619](#) (2001b:60093)
 21. Yor, Marc. Some aspects of Brownian motion. Part I. Some special functionals. Lectures in Mathematics ETH Zürich. *Birkhäuser Verlag, Basel*, 1992. x+136 pp. ISBN: 3-7643-2807-X [MR1193919](#) (93i:60155)

