

The scaling limit of senile reinforced random walk.

Mark P Holmes, *University of Auckland*

Abstract

This paper proves that the scaling limit of nearest-neighbour senile reinforced random walk is Brownian Motion when the time T spent on the first edge has finite mean. We show that under suitable conditions, when T has heavy tails the scaling limit is the so-called fractional kinetics process, a random time-change of Brownian motion. The proof uses the standard tools of time-change and invariance principles for additive functionals of Markov chains.

Full text: [PDF](#) | [PostScript](#)

Pages: 104-115

Published on: February 19, 2009

Bibliography

1. G. Ben Arous and J. Cerny. Scaling limit for trap models on Z^d . *Ann. Probab.*, 35(6):2356-2384, 2007. [Math. Review 2353391](#)
2. J. Bertoin. Subordinators: Examples and Applications. In *Lectures on Probability Theory and Statistics: Ecole D'Ete de Probabilites de Saint-Flour XXVII - 1997*. Springer, 1999. [Math. Review 1746300](#)
3. N.H. Bingham, C.M. Goldie, and J.L. Teugels. *Regular Variation*. Cambridge University Press, 1987. [Math. Review 1015093](#)
4. B. Davis. Weak limits of perturbed random walks and the equation $Y_t = B_t + a \sup\{Y_s: s \leq t\} + b \inf\{Y_s: s \leq t\}$. *Ann. Probab.*, 24(4):2007-2023, 1996. [Math. Review 1415238](#)
5. S. Ethier and T. Kurtz. *Markov Processes: Characterization and Convergence*. Wiley, New York, 1986. [Math. Review 0838085](#)
6. W. Feller. *An Introduction to Probability Theory and its Applications vol. 2*. Wiley, New York, 1966.
7. A. Gut. An extension of the Kolmogorov-Feller weak law of large numbers with an application to the St. Petersburg game. *J. Theor. Prob.*, 17:769-779, 2004. [Math. Review 2091561](#)
8. N. Herrndorf. A functional central limit theorem for weakly dependent sequences of random variables. *Ann. Probab.*, 12:141-153, 1984. [Math. Review 0723735](#)
9. M. Holmes and A. Sakai. Senile reinforced random walks. *Stoch. Proc. Appl.*, 117:1519-1539, 2007. [Math. Review 2353038](#)
10. L. Horvath and Q. Shao. Limit distributions of directionally reinforced random walks. *Adv. in Math.*, 134:367-383, 1998. [Math. Review 1617789](#)
11. W. Kager. Diffusion constants and martingales for senile random walks. arXiv:0705.3305v2 2007.
12. R.D. Mauldin, M. Monticino, and H. Weizsacker. Directionally reinforced random walks. *Adv. in Math.*, 117:239-252, 1996. [Math. Review 1371652](#)
13. M.M. Meerschaert and H.-P. Scheffler. Limit theorems for continuous-time random walks with infinite mean waiting times. *J. Appl. Prob.*, 41:623-638, 2004. [Math. Review 2074812](#)
14. E.W. Montroll and G.H. Weiss. Random walks on lattices ii. *J. Math. Phys.*, 6:167-181, 1965. [Math. Review 0172344](#)
15. R. Pemantle. A survey of random processes with reinforcement. *Probability Surveys*, 4:1-79, 2007. [Math. Review 2282181](#)
16. W. Whitt. *Stochastic-process limits*. Springer-Verlag, New York, 2002. [Math. Review 1876437](#)

Research Support Tool

[Capture Cite](#)
[View Metadata](#)
[Printer Friendly](#)

▼ [Context](#)

[Author Address](#)

▼ [Action](#)

[Email Author](#)
[Email Others](#)



[Home](#) | [Contents](#) | [Submissions, editors, etc.](#) | [Login](#) | [Search](#) | [EJP](#)

[Electronic Communications in Probability](#). ISSN: 1083-589X