Mathematics > Probability

Fractional relaxation equations and Brownian crossing probabilities of a random boundary

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(Submitted on 13 Jul 2011)

We analyze here different forms of fractional relaxation equations of order {\nu}\in(0,1) and we derive their solutions both in analytical and in probabilistic forms. In particular we show that these solutions can be expressed as crossing probabilities of random boundaries by various types of stochastic processes, which are all related to the Brownian motion B. In the special case {\nu}=1/2, the fractional relaxation is proved to coincide with Pr{sup_{0 \leqs\leqt} B(s)<U}, for an exponential boundary U. When we generalize the distributions of the random boundary, passing from the exponential to the Gamma density, we obtain more and more complicated fractional equations.

Comments:	27 pages
Subjects:	**Probability (math.PR)**
MSC classes:	60G15, 34A08, 33E12
Cite as:	**arXiv:1107.2515 [math.PR]**
	(or **arXiv:1107.2515v1 [math.PR]** for this version)

Submission history

From: Luisa Beghin [view email]
[v1] Wed, 13 Jul 2011 10:40:16 GMT (24kb)

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