LAW OF THE TIME TO ABSORPTION AT ZERO OF A (NOT-NECESSARILY) SYMMETRIC STABLE LÉVY PROCESS

ANDREAS KYPRIANOU (JOINT WORK WITH ALEXEY KUZNETSOV, JUAN CARLOS PARDO AND ALEX WATSON)

In this talk, we shall explain two methods for computing the law of the time to absorption of a stable process. In the case of symmetric stable processes, we use an explicit Wiener-Hopf factorisation for hypergeometric Lévy processes and the Lamperti transform for the radial part of the stable processes, which is a positive self-similar Markov process. We use these explicit details to consider, and indeed invert, the Mellin transform of the time to absorption at the origin which is equal in law to an integrated exponential hypergeometric Lévy process. In the non-symmetric case, the radial part of the process is no longer a positive self-similar Markov process and a different technique is needed. Here we describe the radial processes through a Markov additive Lévy process (more commonly found in queuing theory), which we can identify, again, in completely explicit form. The time to absorption at the origin can now be identified through the law of the integrated exponential Markov additive process. Remarkably, a peculiar, but nonetheless natural, two-dimensional recurrence equation, describing the Mellin transform of the latter, can be set up and solved explicitly. We discuss applications to the law of a stable process conditioned to avoid the origin.

This is joint work with Alexey Kuznetsov (York, Canada), Juan Carlos Pardo (CIMAT, Mexico) and Alex Watson (Bath, UK).

References

[1] Kuznetsov, A., Kyprianou, A.E., Pardo, J.C. and Watson, A. (2012) The hitting time of zero for a stable process. http://arxiv.org/abs/1212.5153