Transient analysis of one-sided Lévy-driven queues

N. Starreveld, R. Bekker and M. Mandjes

March 25, 2015

Abstract

In this paper we analyze the transient behavior of the workload process in a Lévy input queue. We are interested in the value of the workload process at a random epoch; this epoch is distributed as the sum of independent exponential random variables. We consider both cases of spectrally one-sided Lévy input processes, for which we succeed in deriving explicit results. As an application we approximate the mean and the Laplace transform of the workload process after a deterministic time.

Keywords: Queueing ◦ Lévy processes ◦ fluctuation theory ◦ spectrally one-sided input ◦ transient analysis

Affiliations: N. Starreveld is with Korteweg-de Vries Institute for Mathematics, Science Park 904, 1098 XH Amsterdam, University of Amsterdam, the Netherlands. Email: N.J.Starreveld@uva.nl. R. Bekker is with Department of Mathematics, VU University Amsterdam, De Boelelaan 1081a, 1081 HV Amsterdam, The Netherlands. Email: r.bekker@vu.nl. M. Mandjes is with Korteweg-de Vries Institute for Mathematics, University of Amsterdam, Science Park 904, 1098 XH Amsterdam, the Netherlands. He is also affiliated with EURANDOM, Eindhoven University of Technology, Eindhoven, the Netherlands, and CWI, Amsterdam the Netherlands. Email: m.r.h.mandjes@uva.nl. The research of N. Starreveld and M. Mandjes is partly funded by the NWO Gravitation project NETWORKS, grant number 024.002.003.