TRANSIENT MOMENTS OF THE WINDOW SIZE IN TCP

Andreas H. Löpker
Johan S. H. van Leeuwaarden

Abstract

The window size in TCP can be modeled as a piecewise deterministic Markov process that increases linearly in time and experiences downward jumps at Poisson times. We present a transient analysis of this window size process. Our main result is the Laplace transform of the transient moments. Explicit formulae for the integer and fractional moments are derived, as well as an explicit characterization of the speed of convergence to steady-state. Central to our approach is the infinitesimal generator and Dynkin’s martingale.

Keywords: AIMD, TCP, congestion control, transient moments, relaxation time, rate of convergence, Dynkin’s formula, optional stopping, exponential functional, piecewise deterministic Markov processes.

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1EURANDOM, P.O. Box 513 - 5600 MB Eindhoven, The Netherlands.
Email address: lopker@eurandom.tue.nl

2Eindhoven University of Technology and EURANDOM, P.O. Box 513 - 5600 MB Eindhoven, The Netherlands. Email address: j.s.h.v.leeuwaarden@tue.nl