Another look at the transient behavior of the $M/G/1$ workload process

Brian H. Fralix
Department of Mathematical Sciences
Clemson University
Clemson, SC USA
June 22, 2009

Abstract

We use Palm measures, along with a simple approximation technique to derive new explicit expressions for all of the transient moments of the workload process of an $M/G/1$ queue. These expressions can also be used to derive a closed-form expression for the $n$th moment of the stationary workload, which solves the well-known Takács recursion that generates the waiting time moments of an $M/G/1$ queue that serves customers in a first-come-first-serve manner.

Keywords: Palm distribution, transient behavior, $M/G/1$ queue, $M/G/1$ workload, preemptive-resume discipline, waiting time recursion

MSC: 60K25, 60G55