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**Mariana Olvera-Cravioto\*** (molvera@ieor.columbia.edu), 306 S. W. Mudd Building, 500 W. 120th Street, New York, NY 10027, and **Peter W. Glynn**. *Approximations for the waiting time distribution in an M/G/1 queue with heavy tails.*

We consider an M/G/1 queue with heavy-tailed processing times, in particular, having either a regularly varying or semiexponential distribution. It is well known that when the traffic intensity is close to one, the steady-state distribution of the waiting time can be approximated accurately by the heavy-traffic approximation. On the other hand, given the heavy-tailed nature of the processing times, the tail distribution can also be approximated by the so-called heavy-tailed asymptotic. These two approximations are very different in nature, with the former predicting an exponentially decaying tail, and the latter a subexponential one.

Our results provide new approximations that are uniform in the traffic intensity, and from which one can easily recover both the heavy-traffic and heavy-tailed approximations by looking at appropriate combinations of the traffic intensity and tail values. In the case of the M/G/1 queue with regularly varying processing times, it is shown that the tail distribution sharply transitions from the heavy-traffic domain to the heavy-tailed domain, while for the queue with semiexponential processing times we can identify a third, intermediate region. (Received September 08, 2008)