Corrected phase-type approximations of heavy-tailed queueing models in a Markovian environment

E. Vatamidou ∗  I.J.B.F. Adan †  M. Vlasiou ‡  A.P. Zwart ‡
e.vatamidou@tue.nl  i.j.b.f.adan@tue.nl  m.vlasiou@tue.nl  Bert.Zwart@cwi.nl

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Abstract

We develop accurate approximations of the delay distribution of the MArP/G/1 queue that capture the exact tail behavior and provide bounded relative errors. Motivated by statistical analysis, we consider the service times as a mixture of a phase-type and a heavy-tailed distribution. With the aid of perturbation analysis, we derive corrected phase-type approximations as a sum of the delay in an MArP/PH/1 queue and a heavy-tailed component depending on the perturbation parameter. We exhibit their performance with numerical examples.

∗Eurandom and Department of Mathematics & Computer Science, Eindhoven University of Technology, P.O. Box 513, 5600 MB Eindhoven, The Netherlands
†Department of Mechanical Engineering, Eindhoven University of Technology, P.O. Box 513, 5600 MB Eindhoven, The Netherlands
‡Centrum Wiskunde & Informatica (CWI), P.O. Box 94079, 1090 GB Amsterdam, The Netherlands