

On the accuracy of phase-type approximations of heavy-tailed risk models

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Abstract

Numerical evaluation of ruin probabilities in the classical risk model is an important problem. If claim sizes are heavy-tailed, then such evaluations are challenging. To overcome this, an attractive way is to approximate the claim sizes with a phase-type distribution. What is not clear though is how many phases are enough in order to achieve a specific accuracy in the approximation of the ruin probability. The goals of this paper are to investigate the number of phases required so that we can achieve a pre-specified accuracy for the ruin probability and to provide error bounds. Also, in the special case of a completely monotone claim size distribution we develop an algorithm to estimate the ruin probability by approximating the excess claim size distribution with a hyperexponential one. Finally, we compare our approximation with the heavy traffic and heavy tail approximations.

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