Moment series inequalities for the discrete-time
bulk service queue

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Abstract: We consider a discrete-time bulk service queueing model. The mean and variance of
the stationary queue length can be expressed by means of moment series: series over the zeros in
the closed unit disk of the characteristic equation. We represent these moment series in terms of
moments of random variables related to the unused service capacity and use these representations
to prove simple and sharp bounds on the moment series. We pay considerable attention to the
case in which the arrivals follow a Poisson distribution, for which additional properties are proved
leading to even sharper bounds. The Poisson case serves as a pilot study for a broader range of
distributions.

Keywords: bulk service queue, discrete-time, zeros, moment inequalities

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