The last minutes before extinction

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Abstract

A big subcritical (and even general multi-type) branching population first declines exponentially, by the law of large numbers, and then it will survive according to some extreme value distribution. Indeed, under broad conditions the time to extinction T is proportional to the logarithm of the starting number plus a translated Gumbel random variable, ([1]).

As a consequence, the population size at time uT, 0<u<1, properly normed, converges in distribution, as the starting number tends to infinity. The approximation is bad, though, for u close to one. We study the population size at time T-u, and have explicit results for continuous time Markov branching.

References

[1] Jagers, P., F.C. Klebaner and S. Sagitov (2007). *On the path to extinction.* Proc. Natl. Acad. Sci. USA, 104 (15), 6107-6111.