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QUASISTATIONARITY OF CONTINUOUS-TIME MARKOV CHAINS WITH POSITIVE DRIFT

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Abstract

We shall study continuous-time Markov chains on the nonnegative integers which are both irreducible and transient, and which exhibit discernible stationarity before drift to infinity "sets in". We will show how this 'quasi' stationary behaviour can be modelled using a limiting conditional distribution: specifically, the limiting state probabilities conditional on not having left 0 for the last time. By way of a *dual* chain, obtained by killing the original process on last exit from 0, we invoke the theory of quasistationarity for *absorbing* Markov chains. We prove that the conditioned state probabilities of the original chain are equal to the state probabilities of its dual conditioned on non-absorption, thus allowing us to establish the simultaneous existence, and then equivalence, of their limiting conditional distributions. Although a limiting conditional distribution for the dual chain is always a quasistationary distribution in the usual sense, a similar statement is not possible for the original chain.

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