

A TIME-DEPENDENT STUDY OF BIRTH-DEATH PROCESSES, VIA THE KNOCKOUT QUEUE

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We present a new approach towards studying the time-dependent behavior of birth-death processes, whose birth rates and death rates are nonincreasing and nondecreasing, respectively, with respect to the state variable. This approach involves interpreting such a birth-death process as the queue-length process of what we refer to as the ‘knockout queue’, which is a queueing system where new arrivals are allowed to ‘knockout’, or eliminate customers upon arrival. Applications to both multiserver and finite-capacity queues will be presented.