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# Steady-State Behavior of a Multi-Phase M/M/1 Queue in Random Evolution Subject to Catastrophe Failure

**Authors :** Reni M. Sagayaraj, Anand Gnana S. Selvam, Reynald R. Susainathan

**Abstract :** In this paper, we consider stochastic queueing models for Steady-state behavior of a multi-phase M/M/1 queue in random evolution subject to catastrophe failure. The arrival flow of customers is described by a marked Markovian arrival process. The service times of different type customers have a phase-type distribution with different parameters. To facilitate the investigation of the system we use a generalized phase-type service time distribution. This model contains a repair state, when a catastrophe occurs the system is transferred to the failure state. The paper focuses on the steady-state equation, and observes that, the steady-state behavior of the underlying queueing model along with the average queue size is analyzed.

**Keywords :** M/G/1 queuing system, multi-phase, random evolution, steady-state equation, catastrophe failure
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