

## **A Single Server Queue with Two Phases of Heterogeneous Service under Bernoulli Schedule and a General Vacation Time**

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### **Abstract**

We consider a single server queue with Poisson input, two phases of heterogeneous service with Bernoulli schedule and a general vacation time, where the server provides two phases of heterogeneous service one after the other to the arriving customers. After completion of both phases of service the server either goes for a vacation with probability  $\theta$  ( $0 \leq \theta \leq 1$ ) or may continue to serve the next unit, if any, with probability  $(1 - \theta)$ . Otherwise, it remains in the system until a customer arrives. For this model, we first obtain the steady state probability generating functions for the queue size distributions at a random epoch as well as at a departure epoch. Next, we derive the Laplace Stieltjes transform of the waiting time distribution. Finally, we obtain some system performance measures and discuss some important particular cases of this model.

*Keywords:*  $M/G/1$  Queue, Two Phases of Heterogeneous Service, Bernoulli Schedule, Generalized Vacation Time, Queue Size, Waiting Time and Busy Period.