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Liang Hong* (lhong@bradley.edu), Department of Mathematics, Bradley University, 1501 W Bradley Avenue, Peoria, IL 61625, and **Jyotirmoy Sarkar** and **Bruno Bieth**. *An Innovative Approach to Limiting Availability Using Extended Semi-Markov Processes*.

We are interested in a one-unit system supported by an identical spare unit. It is perfectly repaired by an in-house person, if doable within a random or deterministic patience time, or else by a visiting expert. We generalize the previous results in the case of the exponential distribution to the case of arbitrary continuous life and repair time distributions. Our technique involves extending the limiting probability theorem of semi-Markov processes to that of extended semi-Markov processes. We will explain the shortcomings of the traditional Laplace transformation technique by demonstrating that our approach is superior to the Laplace transformation approach. Finally, we introduce the line digraph approach which methodically converts the continuous time stochastic process (CTSP) into an SMP (albeit on a different state space). Thereafter, standard limiting theorems for an SMP yield the steady state probabilities, which can be related back to those of the original CTSP. The line digraph approach is applicable to many other stochastic models. (Received April 30, 2011)