



Age Replacement and Service Rate Control of Stochastically Degrading Queues (Paperback)

By Patrick S Chapin

Biblioscholar, United States, 2012. Paperback. Condition: New. Language: English . Brand New Book ***** Print on Demand *****.This thesis considers the problem of optimally selecting a periodic replacement time for a multiserver queueing system in which each server is subject to degradation as a function of the mean service rate and a stochastic and dynamic environment. Also considered is the problem of optimal service rate selection for such a system. In both cases, the performance metric is the long-run average cost rate. Analytical expressions are obtained, in terms of Laplace transforms, for the nonlinear objective functions, necessitating the use of numerical Laplace transform inversion to evaluate candidate solutions in conjunction with standard numerical algorithms. Due to the convexity of the objective function, the optimal replacement time is computed using a hybrid bisection-secant method which yields globally optimal solutions. The optimal service rates are obtained via gradient search methods but are only guaranteed to provide locally optimal solutions. The analytical results are implemented on three notional examples that demonstrate the benefits of dynamically adjusting service rates under the described maintenance policy.



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