

Optimal Periodic Preventive-Maintenance Policy For A System Where Its Failure/Repair Follows The Non-Homogeneous Pure Birth Process

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Abstract

A periodic preventive maintenance policy is considered for a deteriorating repairable system. On each failure the system is repaired, at periodic times iT ($i = 1, 2, \dots, N-1$) the system is preventively maintained (PM) to improve its reliability performance, and at the time NT the system is replaced. The failure/repair process between two PMs follows the Non-Homogeneous Pure Birth Process (NHPBP) which is a generalized version of the Non-homogeneous Poisson process (NHPP). The reliability improvement made by a PM action is stochastically modeled based on the properties of NHPBP. The cost for each PM is variable reflected the reliability condition of the system at that PM time. The PM policy are characterized by the two parameters (N, T) , optimal (N^*, T^*) which minimize the long-run expected cost rate of a replacement cycle are derived and calculated based on a two-stage optimization procedure, and detailed properties of (N^*, T^*) are investigated and observed through numerical examples. Because the PM model in this study is developed based on a new type of failure/repair process (NHPBP) instead of the conventional minimal repair process (NHPP), the current work would suggest a new research direction in the study of PM.

Keywords

Non-Homogeneous Pure Birth Process, preventive maintenance, worse-than-minimal-repair, long-run expected cost rate, optimal PM schedule.

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Biographies

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