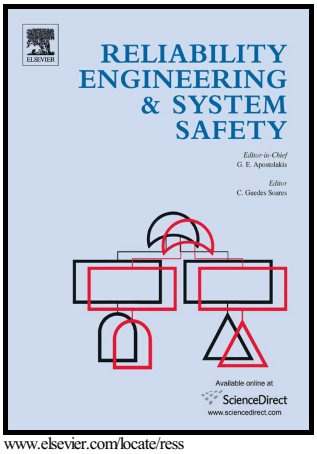

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Age Replacement Models: A Summary with New Perspectives and Methods *

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Abstract Age replacement models are fundamental to maintenance theory. This paper summarizes our new perspectives and methods in age replacement models: First, we optimize the expected cost rate for a required availability level and vice versa. Second, an asymptotic model with simple calculation is proposed by using the cumulative hazard function skillfully. Third, we challenge the established theory such that preventive replacement should be non-random and only corrective replacement should be made for the unit with exponential failure. Fourth, three replacement policies with random working cycles are discussed, which are called overtime replacement, replacement first, and replacement last, respectively. Fifth, the policies of replacement first and last are formulated with general models. Sixth, age replacement is modified for the situation when the economical life cycle of the unit is a random variable with probability distribution. Finally, models of a parallel system with constant and random number of units are taken into considerations. The models of expected cost rates are obtained and optimal replacement times to minimize them are discussed analytically and computed numerically. Further studies and potential applications are also indicated at the end of discussions of the above models.

Keywords Random replacement, asymptotic replacement, overtime replacement, shortage cost, working cycle, finite life, parallel system.

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