Moment-based approach for some age-based replacement problems

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In this paper we develop statistical inference approaches for three age replacement policies; classical age replacement, opportunity-based age replacement first and opportunity-based age replacement last, when the failure time distribution of an item is unknown. More specifically, we utilize the sample moments of the failure time distribution and estimate the optimal age replacement times for three problems above. Further, we derive the upper and lower bounds of the expected cost functions per unit time for respective age-based replacement problems, under the assumption that the failure time has an arbitrary IFR (increasing failure rate) distribution function with finite moments. Finally, we investigate the inference performance of our moment-based approaches in numerical examples, and the applicability of them under the partial information on the failure time distribution.