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# Modeling recurrent events for repairable systems under Worse than Old assumption

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**Summary.** \*Coming soon Aging of a repairable system, or of a set of repairable systems, includes several unexclusive notions aimed to model and analyse the increasing intensity of failures or repairs.

The well-known term of recurrent events is usually used in this framework to model the multiple maintenance actions performed on systems rejuvenated by a technical operation, such as repair action after failure, replacement action after failure, replacement action after design change or replacement action due to a conditional maintenance policy. The aging (or wear-out) of a repairable system is manifested by the increase in the frequency of repair actions undertaken after each failure. That implies more costly restorations of the systems's operating condition and increasing expected number of interventions by time unit.

In this paper, we shall focus on a new model (LEYP Model) where the repair action has a Worse Than Old effect (WTO). The increasing of the conditional intensity is rather induced by the number of previous repair actions than by time. The LEYP model is defined and some comparison with existing imperfect repair models is given. We introduce a covariate-dependent model in order to take into account of the effect of internal or external factors. Constant and time-dependent covariates are used. The estimation procedure is described for left-truncated are right-censored data using a multiple systems data set and provides some useful formulae of prediction of the number of failures in a future period. An application to data from the water distribution system of the city of Oslo (Norway) is given.