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## **Statistical inference for a Wiener-based degradation model with imperfect maintenance actions under different observation schemes**

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In this article, technological or industrial equipment that are subject to degradation are considered. These units undergo maintenance actions, which reduce their degradation level.

The paper considers a degradation model with imperfect maintenance effect. The underlying degradation process is a Wiener process with drift. The maintenance effects are described with an Arithmetic Reduction of Degradation ( $ARD_1$ ) model. The system is regularly inspected and the degradation levels are measured.

Four different observation schemes are considered so that degradation levels can be observed between maintenance actions as well as just before or just after maintenance times. In each scheme, observations of the degradation level between successive maintenance actions are made. In the first observation scheme, degradation levels just before and just after each maintenance action are observed. In the second scheme, degradation levels just after each maintenance action are not observed but are observed just before. On the contrary, in the third scheme, degradation levels just before the maintenance actions are not observed but are observed just after. Finally, in the fourth observation scheme, the degradation levels are not observed neither just before nor just after the maintenance actions.

The paper studies the estimation of the model parameters under these different observation schemes. The maximum likelihood estimators are derived for each scheme.

Several situations are studied in order to assess the impact of different features on the estimation quality.

Among them, the number of observations between successive maintenance actions, the number of maintenance actions, the maintenance efficiency parameter and the location of the observations are considered. These situations are used to assess the estimation quality and compare the observation schemes through an extensive simulation and performance study.

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