Contribution ID: **51** Type: **not specified**

Modeling of repairable systems using Poisson processes and their extensions. Application to reliability analysis of wind turbine data.

Tuesday, June 28, 2022 10:50 AM (20 minutes)

Reliability of repairable systems are commonly analyzed with the use of simple Poisson processes. Using data for operation of wind turbines as motivation and illustration, we show, step by step, how certain extensions of such a model can increase its usefulness as both a realistic and easily interpretable mathematical model. In particular, standard regression modeling may for example account for observable differences between individual systems. For wind turbines, this may for example be measurable differences in the environment, or rated power of the turbine. It turns out, however, that the existence of unobservable differences between individual systems may affect conclusions if they are not being taken into account. It will be shown how such heterogeneities may be modeled in the Poisson process case using a "frailty"approach known from survival analysis. The intuitive interpretation is that individual frailties will represent the effect of missing covariates. It will be demonstrated in the wind turbine data that the introduction of frailties improves model fit and interpretative power. Other relevant aspects for analyses of failure data, which will be discussed, relate to maintenance and seasonality.

Keywords

repairable system; Poisson process; heterogeneity

Primary authors: LINDQVIST, Bo Henry (Norwegian University of Science and Technology); Dr SLIMACEK, Vaclav (Honeywell, Prague)

Presenter: LINDQVIST, Bo Henry (Norwegian University of Science and Technology)

Session Classification: CONTRIBUTED Reliability 1

Track Classification: Reliability