

AMMSI - 1st Workshop

Ageing and Maintenance in reliability :
Modelling and Statistical Inference

March 2012 - February 2016

January 24, 2013 - Pau

Objectives - 1

Provide innovative methods and mathematical tools for the management of the ageing of industrial systems.

Basic Research :

- **Stochastic modelling**
 - New models of degradation, failure and maintenance of complex systems
 - Recurrent events, competing risks, covariates, ...
- **Statistical inference**
 - New statistical methods for analyzing such models and data from operation feedback
 - Parametric, semi- or non-parametric methods, including goodness-of-fit tests, treatment of missing data, ...

Objectives - 2

Industrial Research :

- Application of theoretical results for the management of ageing and maintenance planning of industrial systems
- Tools for decision support and industrial implementation of these methods
- Development of computer codes : R, Matlab, MARS

Scientific issues

- Theoretical results on statistical inference of imperfect maintenance models.
- Goodness-of-fit tests for these models.
- Including covariates in these models.
- Integration of imperfect maintenance in degradation models.
- Dynamic maintenance planning.
- Development of new maintenance models : multivariate, with random or non-symmetric effects,...
- Development of new degradation models : multivariate, competing, perturbed, with changes of degradation rate,...
- Exploitation of online monitoring data.
- Treatment of masked data.

Main features of the project

- Interface between mathematics and industry.
- Probabilistic and statistical aspects.
- Link both approaches of ageing, lifetime and degradation.
- Highlight multivariate aspects, both on maintenance and degradation models

Partners

- Institut Polytechnique de [Grenoble](#) - Laboratoire Jean Kuntzmann (LJK)
- Laboratoire de Mathématiques et de leurs Applications - Université de [Pau](#) et des Pays de l'Adour (LMAP)
- Laboratoire de Mathématiques de [Besançon](#) (LMB)
- Université de Technologie de [Troyes](#) - Institut Charles Delaunay/Laboratoire de Modélisation et Sûreté des Systèmes - Sciences et Technologie pour la Maîtrise des Risques (ICD)
- Electricité de France ([EDF](#))
- Société Nationale des Chemins de fer Français ([SNCF](#))

Program - 1

- Introduction : [O. Gaudoin](#), [S. Mercier](#), [C. Paroissin](#)
- 9 :15-10 :15 : [B.H. Lindqvist](#) (Norwegian University of Science and Technology, Trondheim, Norway) : "On maintenance modeling by first passage times of stochastic processes"
- 10 :15-10 :45 : [J.Y. Dauxois](#) (LMB-IMT) : "Some Goodness of Fit Tests for Imperfect Repair Models in Reliability"
- Break
- 11 :15-11 :45 : [Y. Dijoux](#) (UTT) : "Generalized Random Sign and Alert Delay Models for Imperfect Maintenance"
- 11 :45-12 :15 : [M. Krit](#) (LJK-EDF) : "Likelihood based goodness-of-fit tests for the Weibull and Extreme Value distributions"

Program - 2

- 12 :00-14 :00 : Lunch : Restaurant La Vague
- 14 :00-15 :00 : [I.T. Castro](#) (Universidad de Extremadura, Cáceres, Spain) : "Two models of imperfect delayed repair in a continuously monitored system and subject to a continuous deterioration"
- 15 :00-15 :30 : [I. Kojadinovic](#) (LMAP) : "Nonparametric tests for change-point detection à la Gombay and Horvath"
- 15 :00-16 :00 : Break
- 16 :00-16 :30 : [M. Fouladirad](#) (UTT) : "Prognostic and stochastic modeling of degradation"
- 16 :30-17 :00 : [W. Lair](#) (EDF) : "Maintenance effect modelling of a railway system"
- Dinner : meeting at 20 :15 at hotel A l'hôtel.

Program - 3

Friday

- 9 :00-11 :00 : Meeting of AMMSI members, same room
- After 11 :00 and afternoon : working groups
- 12 :00 : Lunch - Restaurant La Vague