中 央 研 究 院 統 計 科 學 研 究 所
博 士 後 演 講

講　題：**General Degradation Model with Measurement Errors**

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時　間：2021 年 12 月 29 日 (星期三) 下午 14:00-15:00

地　點：中央研究院統計科學研究所 B1F 演講廳，實體與線上同步進行。

※茶會：下午 15：00 開始

Abstract

The lack of sufficient time-to-failure data becomes a challenge to assess the lifetime information of high-reliability products. Since the lifetime is defined by the degradation path first passing the threshold, said w. The common used methods are to fit the quality characteristics (QCs) data, i.e. degradation path, and to make the lifetime inference by the degradation path model.

However, two problems arised. One is measurement error, and the other is wrong model selection. In fact, the measurement is not always the ground truth, because measurement errors are easily caused by people, machines, environment and so on. Seriously, it is possible that the measurement errors could make a monotonic process become a non-monotonic one. This directly results in choosing wrong model which is not consistent to data mechanism.

We propose the general degradation model which based on the independent increment degradation-based process, and considered the heterogeneity including unit-to-unit variation and measurement errors simultaneously. Nevertheless, parameter estimation becomes difficult because of the complex model. We establish the framework via the quasi-Monte Carlo-type method and separation-of-variable transformation to overcome the high dimension integral of likelihood function. Case study demonstrates the measurement error commonly occurs and effects the model selection. The likelihood value is superior to other models without measurement error as well. Finally, evaluate the validity of the measurement error model via goodness of fit.

In short, this illustrates the general degradation model with measurement errors is adequate, and it satisfies the mechanism.

Keywords: independent increment, measurement error, random effect, quasi-Monte Carlo-type method

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