

國立中央大學

統計研究所

學術演講

主 講 人：蔡志群 教授（淡江大學數學學系）

講 題：Statistical Lifetime Inference based on Skew-Normal Accelerated Destructive Degradation Test Model

時 間：105 年 03 月 01 日（星期二）上午 11：00 ~ 12：00

地 點：中央大學鴻經館 M605 室

茶 會：上午 10：30 ~ 11：00 地 點：鴻經館 510 室

ABSTRACT

The accelerated destructive degradation test (ADDT) method provides an effective way to assess the reliability information of highly reliable products whose quality characteristics degrade over time, and can be taken only once on each tested unit during the measurement process. Conventionally, engineers assume that the measurement error follows the normal distribution. However, degradation models based on this normality assumption often do not apply in practical applications. To relax the normality assumption, the skew-normal distribution is adopted in this study because it preserves the advantages of the normal distribution with the additional benefit of flexibility with regard to skewness and kurtosis. Here, motivated by polymer data, we propose a skew-normal nonlinear ADDT model, and derive the analytical expressions for the product's lifetime distribution along with its corresponding p th percentile. Then, the polymer data are used to illustrate the advantages gained by the proposed model. Finally, we addressed analytically the effects of model mis-specification when the skewness of measurement error are mistakenly treated, and the obtained results reveal that the impact from the skewness parameter on the accuracy and precision of the prediction of the lifetimes of products is quite significant. (Joint work with Chien-Tai Lin)

Keywords: accelerated destructive degradation tests, expectation-maximization algorithm, highly reliable products, skew-normal distribution, model mis-specification.

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