Professor Tony Ng

Depart. Mathematical Sciences

Bentley University

Waltham, MA

Date: Friday, Feb. 16, 2024

Time: 1:00 -- 1:50 pm

Location: D2 Lect 2

Degradation Model and Related Applications:
From Light Intensity to Network Reliability

Abstract: In engineering and sciences, the process that a system reduces in performance, reliability, or life span of assets gradually and irreversibly is known as a degradation process. Degradation measurements are recorded over time for prognostics and health management purposes. The degradation models based on stochastic processes have been used to characterize the evolution of degradation measurements. In this talk, I will first introduce the gamma and Wiener degradation models. Then, I will introduce a multi-phase gamma degradation model and discuss the likelihood and Bayesian inference for this model. The gamma process model and the inferential methods are applied to analyze a real data set of light-emitting diodes (LEDs). I will also discuss the application of the degradation models in power grid network reliability analysis and other applications such as network design and cybersecurity. In addition to engineering applications, an application of the degradation models in biopharmaceutical statistics will also be discussed briefly.

Biography: Hon Keung Tony Ng is a Professor with the Department of Mathematical Sciences, Bentley University, Waltham, MA, USA. Before joining Bentley in July 2022, he was at Southern Methodist University for 20 years. He received a Ph.D. degree in mathematics from McMaster University, Hamilton, ON, Canada, in 2002. He is an associate editor of *Communications in Statistics*, *Computational Statistics*, *IEEE Transactions on Reliability*, *Journal of Statistical Computation and Simulation*, *Naval Research Logistics*, *Sequential Analysis*, and *Statistics and Probability Letters*. His research interests include reliability, censoring methodology, ordered data analysis, non-parametric methods, and statistical inference. He has published more than 170 research papers in refereed journals. He is the co-author of the books *Precedence-Type Tests and Applications* (Wiley, 2006) and *Fiber Bundles: Statistical Models and Applications* (Springer, 2023), and co-editor of *Ordered Data Analysis, Modeling and Health Research Methods*; *Statistical Modeling for Degradation Data*; *Statistical Quality Technologies: Theory and Practice*; *Bayesian Inference and Computation in Reliability and Survival Analysis;* and *Recent Advances on Sampling Methods and Educational Statistics*. Professor Ng is an elected senior member of IEEE (2008), an elected member of the International Statistical Institute (2008), and an elected fellow of the American Statistical Association (2016).