

**Department of Mathematical Sciences
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PhD Dissertation Defense

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**Various Approaches on Parameter Estimation in
Mixture and Non-mixture Cure Models**

Monday July 9, 10:00am in SE 215

Advisor: Lianfen Qian

Analyzing life-time data with long-term survivors is an important topic in medical application. Cure models are usually used to analyze survival data with the proportion of cure subjects or long-term survivors. In order to include the proportion of cure subjects, mixture and non-mixture cure models are considered. In this dissertation, we utilize both maximum likelihood and Bayesian methods to estimate model parameters. Simulation studies are carried out to verify the finite sample performance of the estimation methods. Real data analyses are reported to illustrate the goodness-of-fit via Fréchet, Weibull and Exponentiated Exponential susceptible distributions. Among the three parametric susceptible distributions, Fréchet is the most promising.

Next, we extend the non-mixture cure model to include a change point in a covariate for right censored data. The smoothed likelihood approach is used to address the problem of a log-likelihood function which is not differentiable with respect to the change point. The simulation study is based on the non-mixture change point cure model with an exponential distribution for the susceptible subjects. The simulation results revealed a convincing performance of the proposed method of estimation.

A copy of the dissertation is available in the office of Mathematical Sciences, SE 234

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