

RUTGERS UNIVERSITY
DEPARTMENT OF STATISTICS AND BIOSTATISTICS
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Seminar

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Title: Fitting Poisson Process Model to Incomplete Data: Aerodynamic Study of a Methanol
Spray Flame

Date: Wednesday, April 14, 2010

Place: 552 Hill Center

Abstract

Incomplete data arise in many different ways. Randomly censored and truncation data in clinical trials and astronomy are well-known. There is a huge literature devoted to the development of statistical methods and theories for these types of data. But less is developed for those of incomplete data in engineering research. In this presentation we analyze such a data set collected by the Phase Doppler Interferometry (PDI). PDI is a non-intrusive technique for obtaining information about spray characteristics in aerosol science. Examples include liquid fuel spray in combustion, spray coatings, and pesticide dispensing. PDI can record the velocity of individual droplets in a spray. But it will miss some of the droplets due to a recurring presence of dead time. Proper correction for dead time is necessary otherwise the statistical estimation will be biased. The incompleteness of the PDI recordings results in a multi-modal interarrival time distribution of droplets (not an exponential distribution). Yet it is shown that the a homogeneous Poisson process fits well our experimental spray data. We estimate the spray diffusion rate (Poisson intensity) with correction for dead time under various conditions. The interplay between model fitting and incomplete data is emphasized. The asymptotic distribution of the estimates is derived from a strictly stationary process. Experimental data of methanol spray flame from the National Institute of Standards and Technology will be used for illustration.