Statistical Engineering Division Seminar

Wednesday January 24, 1996, 11:00 am

Lecture Room D, Administration Bldg.

NIST

Gaithersburg, MD

Estimating a Common Mean in an Interlaboratory Study

Mark G. Vangel

Statistical Engineering Division
National Institute of Standards and Technology

In this presentation, new results for the analysis of a series of experiments made on nominally the same quantity are developed and illustrated. The methods introduced have broad applicability; illustrative example analyses of interlaboratory study data are discussed. Following Cochran (1937, 1954, 1980) and others, this problem is formulated as a one-way unbalanced random-effects ANOVA with heteroscedastic within-group variances. A reparametrization of the likelihood equations leads to simplified computations, easy identification and interpretation of multimodality of the likelihood, and (via a non-informative prior Bayesian approach) approximate confidence regions on the mean and between-group variances. The close relationship between maximum-likelihood and an estimator due to Mandel and Paule (Mandel and Paule 1970, Paule and Mandel 1983) is also demonstrated. This is joint work with Andrew Rukhin of the University of Maryland, Baltimore County.

Mark Vangel received a S. B. degree in Mathematics in 1980, and a S. M. degree in Mathematics (with a concentration in Statistics) in 1981, both from the Massachusetts Institute of Technology, and A. M. and Ph.D. degrees in statistics from Harvard University, completing a dissertation in 1992 (under the supervision of Herman Chernoff) on applications of iterative algorithms for integral equations of the first kind to problems in Statistics. From October 1993 until October 1995, he was a NRC postdoctoral associate in the Statistical Engineering Division. Before that, he worked for several years for the Army Research Laboratory, Materials Directorate in Watertown, Massachusetts, providing mathematical, computing, and statistical support to this materials research laboratory. He has participated in Mil-Handbook-17, *Polymer Matrix Composites*, since 1984, and he has chaired the Statistics Working Group for this handbook since 1991.

(A NIST Shuttle is scheduled 30 minutes before the talk for pickup from NIST North.)

[NIST contact: Mark G. Vangel, 301-975-3208]