

**Department of Applied Mathematics and Statistics
The Johns Hopkins University**

SEMINAR

Robert Serfling
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May 5, 2005
304 Whitehead Hall
Refreshments: 3:30 p.m.
Seminar: 4:00 p.m.

**DEPTH FUNCTIONS IN MULTIVARIATE ANALYSIS
AND COMPUTATIONAL GEOMETRY**

ABSTRACT

Depth functions are center-outward orderings of points in higher-dimensional data spaces or parameter spaces. They are playing increasingly significant roles in nonparametric multivariate inference and computational geometry problems. This talk will cover historical antecedents, general perspectives, application contexts, and current developments. General features of depth functions and their connections with multivariate outlyingness functions, multivariate quantile functions, and multivariate signs and ranks will be examined. New nonparametric multivariate methods based on depth functions will be discussed, including descriptive measures, outlier identification methods, and hypothesis testing procedures. Depth-based approaches to outlier detection and handling in shape-fitting problems in computational geometry will be described. Some theoretical problems such as convergence theory and Bahadur representations will be discussed. Finally, computational issues will be addressed.