

実空間および多様体上の多変量統計解析,
並びに関連する数理分野の研究;
お会いした科学者達への感謝の気持ちと共に

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I am very pleased and feeling honored with the 2017 prize of Japan Statistical Society being rewarded. I enjoyed working together with some statisticians, Professors R. J. Muirhead (my thesis adviser at Yale University), A. W. Davis, G. S. Watson, and P. E. Jupp, to whom I would like to express my sincere thanks for my having learned much from them. My research interests are mainly (1) multivariate statistical analysis on the usual real spaces, (2) multivariate analysis on the special manifolds, i.e., Stiefel manifolds and Grassmann manifolds, and also on the shape spaces of general dimension, and (3) developing mathematical properties of the invariant polynomials with multiple matrix arguments, extending the zonal polynomials with a single matrix argument.

In particular, as for (2), the followings were discussed: the basic population distributions on the manifolds, various decomposition theorems, distributions of canonical correlation coefficients of general dimension, sampling theory and inference problems, asymptotic theorems for the cases of large sample, large concentration and high dimension, Procrustes analysis, density estimation, measures of orthogonal association. Distribution theory and inference problems on the shape spaces in shape analysis (coworking with Prof. P. E. Jupp) were also considered.

In the discussions of (1) and (2), (3) the theory of the invariant polynomials with multiple matrix arguments plays an important role for the derivations. I learned much working together with Prof. A. W. Davis. Defining the invariant polynomials with multiple symmetric matrices, various mathematical properties of them were derived. Then, the generalized Hermite polynomials and Laguerre polynomials with multiple symmetric matrices were defined and discussed and were utilized in multivariate distribution theory. Furthermore, mathematical properties of functions and polynomials with matrix arguments were discussed; linearization, three-term recurrence relations, Christoffel-Darboux formulas, and Fourier transforms.