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ORNL

FOREIGN TRIP REPORT

ORNL/FTR-3654

DATE: June 21, 1990

SUBJECT: Report of Foreign Travel of Toby J. Mitchell, Statistician, Engineering Physics and Mathematics Division, ORNL

ORNL/FTR--3654

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TO: Alvin W. Trivelpiece

FROM: Toby J. Mitchell

PURPOSE: To attend and present an invited paper at the Workshop on Experimental Design and Quality Improvement held at the Institute of Statistics of the Academia Sinica of the Republic of China in Taipei, Taiwan, June 11-13.

SITES VISITED: June 10-14, 1990 Institute of Statistics Taipei, Taiwan

ABSTRACT:

This report, dated June 21, 1990, covers the trip to Taiwan of Dr. Toby J. Mitchell, Statistician in the Mathematical Sciences Section, Engineering Physics and Mathematics Division, Oak Ridge National Laboratory. The trip was supported by the Institute of Statistics of the Academia Sinica of the Republic of China (hereafter called "the Institute").

The purpose of the trip was to attend and present an invited paper at the Workshop on Experimental Design and Quality Improvement held at the Institute in Taipei, Taiwan, June 11-13. The presented paper described two applications of recent work at ORNL in the design and analysis of computer experiments.

The Institute was the only site visited. Principal contacts were with Dr. Min-Te Chao, the Director of the Institute, and with the other five speakers: Dr. V. N. Nair (AT&T Bell Laboratories), Professor R. A. Bailey (Rothamsted Experimental Station, U.K.), Professor S. Hedayat (University of Illinois, Chicago), Professor C. F. J. Wu (University of Waterloo, Canada), and Professor C.-S. Cheng (University of California, Berkeley).

The main activities consisted of attending the Workshop, contributing to the discussions, and presenting one of the talks. Informal technical discussions were somewhat limited, and mostly involved the other speakers. The main benefits to our research, which is funded by DOE's Applied Mathematical Sciences Program, was to gain greater international exposure for our work, and to discover new applications for it.

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II. Report

A. Purposes

To attend and present an invited paper at the Workshop on Experimental Design and Quality Improvement held at the Institute in Taipei, Taiwan, June 11-13. This meeting provided an opportunity for me to present and discuss with the statisticians at the Institute and with the other speakers the methods and applications of Design and Analysis of Computer Experiments (DACE) that we and others have developed. DACE has become a major new direction in the Computational Statistics research at ORNL, funded by the Applied Mathematical Sciences program of DOE.

It is the intention of the Institute to publish the papers presented at the workshop (subject to a review process) in *Statistica Sinica*, a new international statistical journal that is co-sponsored by the Institute. This was also a factor in my participation, since it offered an opportunity to attain greater exposure for our work at the international level.

B. Activities

My main activities consisted of attending the Workshop, at which there were six talks, and of presenting one of the talks. (The Workshop program is included in the Appendix to this report.) I also had some informal technical discussions, none in very much depth, on the content of the talks, primarily with the other speakers.

Design of experiments was the theme of the Workshop, but within that area, the range of topics discussed was very broad. Perhaps the most interest and emphasis was on the so-called "Taguchi Method," which has attracted much attention to statistical design of experiments for quality improvement in manufacturing. This method is of particular interest to us, not only because it has been applied to computer experiments, and is therefore in some sense a competitor of ours, but also because we are beginning to see how our methods could be adapted to provide more efficient (we think) physical experments than are currently being done by the Taguchi method.

Aside from some very brief technical discussions, my main conversations with the local statisticians, including Dr. Min-Te Chao, the Director of the Institute, centered on the organization of the Institute itself. The *Academia Sinica* consists of nearly 20 Institutes, each for a particular scientific discipline (Physics, Chemistry, Mathematics, Statistics, etc.). Although interactions with industry and government applications are encouraged, the work is oriented more towards basic research rather than toward particular missions. When I asked if there was some feeling in the government that the Academy was doing work that was more properly the province of universities, they thought this an odd notion. The Academy has its own budget, and its head reports directly to the President of the Republic. The building for Statistics, which is quite impressive, houses about 20 Ph.D. statisticians, and there are currently openings for 10 others.

Although the Institute paid for my trip, I think that DOE also benefitted, primarily because we were able to gain greater international exposure in a research area, supported by DOE's Applied Mathematical Sciences Program, in which we have taken a lead.

C. Appendix

A. Itinerary

6/9-10/90: Travel from Oak Ridge, Tennessee to Taipei, Taiwan.

6/11-13/90: Workshop, Institute of Statistics, Taipei

6/14/90: Travel from Taipei to Hong Kong

6/14-16/90: Vacation, Hong Kong

6/16/90: Travel from Hong Kong to Oak Ridge, Tennessee.

B. Persons Contacted to a Significant Extent

Dr. Min-Te Chao, Director, Institute of Statistics, Academia Sinica

Dr. V. N. Nair (AT&T Bell Laboratories)

Professor R. A. Bailey (Rothamsted Experimental Station, U.K.)

Professor S. Hedayat (University of Illinois, Chicago)

Professor C. F. J. Wu (University of Waterloo, Canada)

Professor C.-S. Cheng (University of California, Berkeley)

C. Literature Acquired

None.

D. Distribution

1. John J. Easton, Jr., Assistant Secretary for International Affairs, DOE, Washington, D.C. 20545
2. Dr. James F. Decker, Acting Director, Office of Energy Research, Washington, D.C. 20545
3. Dr. Donald K. Stevens, Associate Director for Basic Energy Sciences, Washington, D.C. 20545
4. Elizabeth Q. Ten Eyck, Director, Division of Safeguards and Security (DP-34) Department of Energy, Washington, D.C. 20545
5. A. Bryan Siebert, Jr., Classification and Technology Policy (DP-323.2), Department of Energy, Washington, D.C. 20545
6. J. A. Reafsnyder, Deputy Assistant Manager, Energy Research and Development, Oak Ridge Operations, P.O. Box 2001, Oak Ridge, Tennessee 37831
7. D. J. Cook, Director, Safeguards and Security Division, DOE/ORO
8-9. Office of Scientific and Technical Information, P. O. Box 62, Oak Ridge, TN 37831-0062
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