在中国的三周

The Day Before Tomorrow

Three Weeks in the People's Republic of China

by Jan Karel Lenstra

On September 2, 1983, Henk Tijms of the Free University and I left Amsterdam for a three week visit to China. We stayed for two weeks at the Institute of Applied Mathematics of the Academia Sinica in Beijing (Peking in former days, but Beijing sounds much better). We paid brief visits to the Institute of System Science and the Computing Center, both of the Academia Sinica, and to the Department of Mathematics of Beijing University. After leaving Beijing, we stayed at the Technical University of Xi'an and at the University of Hangzhou for three days each, spent a few days in Shanghai and Hongkong, and returned to Amsterdam on September 25. Our trip was financed through the cultural agreement between the Netherlands and China. The following is a brief account of our experiences and impressions.

Research

How rewarding is it, from a professional point of view, to spend three weeks in China? If you are a calligrapher, a cook, or a magician, then it must be extremely satisfying. If you are working in the mathematics of operations research, then it will be interesting to observe what is going on but you should not expect to encounter the latest developments in the field.

The investigations in which Chinese operations researchers are engaged extend the theory of the early sixties. Due to the 'cultural revolution' (the use of quotes here is a recent Chinese tradition), they have not been able to maintain their contacts and to follow new developments. This implies for the area of *mathematical programming* that the classical variants of nonlinear programming receive most attention and that combinatorial optimization, which grew into a discipline of its own during the seventies, is practically virgin territory. Also in *stochastic optimization* the traditional subjects are emphasized.

It goes without saying that our Chinese colleagues are very much aware of this situation. Through all kinds of bilateral agreements Western scientists are lecturing in China and Chinese students are educated abroad. We were

particularly impressed by the efforts of Feng Kang, director of the Computing Center in Beijing, in formulating and pursuing an active research policy. Chinese mathematics and computer science have a considerable potential - but *tomorrow* may be five or ten years away.

An unexpected side benefit of our trip was the opportunity to meet a number of Western mathematicians. After all, September is the best time to visit China and foreign scientists are put in the same hotel.

Development and applications

Hua Loo-Keng will be well known to many readers for his fundamental work in pure mathematics. He is omnipresent as a researcher, as director of three institutes of the Academia Sinica, as editor-in-chief of several journals, and as chairman of a number of societies.

In the mid-sixties, he became involved in popularizing mathematical methodology. He and his assistants 'visited twenty-two provinces, hundreds of cities, and thousands of factories, meeting millions of people' [3]. The purpose of their mission was to promote techniques that are effective enough to yield results and simple enough to be understandable and applicable by non-specialists in a small-scale environment. Reference [2] lists 147 actual applications. Reference [3] provides information on the mathematical methods that were popularized. Among these are the *optimum seeking method* (one-dimensional Fibonacci search) and the *overall planning method* (the critical path method and a scheduling rule in disguise). My stay at the Institute of Applied Mathematics was a welcome opportunity to learn more about the amazing scope of this campaign, the underlying mathematical ideas, and the practical results.

I did not succeed in finding out much about the use of advanced mathematical programming techniques in large-scale decision situations. An exception is the successful work [1] of Gui Xiangyun (my hostess in Beijing) on the distribution of crude oil to refineries and of the resulting products to the customers. Her approach is based on Benders decomposition and as such nicely matches the Chinese-Dutch cultural cooperation.

Non-scientific aspects

When you are visiting China, you will soon discover that lecturing to and talking with your colleagues leaves ample time for other activities. I have already alluded to Chinese banquets and magic shows. They are very much worth attending. As to sightseeing, I recommend that, after having seen the Great Wall, you shouldn't miss the Lama Temple in Beijing, the Qin excavations near Xi'an, and the West Lake at Hangzhou. One of your hosts is always ready to join you, and the academy's guide acts as organizer in the background.

Communication

Communicating with the Chinese people is a chapter in itself. In giving a lecture, it is absolutely necessary to have an interpreter. He or she, being a volunteer from the audience rather than a professional interpreter, is faced with the heavy task of comprehending a lot of new material and translating it simultaneously. I am indebted to five colleagues (Gui, Liu, Wang, Ge, and Chang) for their heroic and, as far as I can judge, successful achievements in this respect.

Due to cultural differences, life can be difficult. For instance, you should *never* ask a yes/no question (as one of our neighbors did who went to the counter in the Temple of Heaven, asking 'Sprechen Sie Deutsch?'). The answer will invariably be affirmative. Except on Thursdays. 'I see you last Saturday?' *Next* Saturday, I hope? 'Uh... *the day before tomorrow*.'

References

[1] X. Gui, *Distribution system planning for crude oil and petroleum products in China by mathematical programming,* Institute of Applied Mathematics, Academia Sinica, Beijing, 1983.

[2] H. Halberstam (ed.), *Loo-Keng Hua Selected Papers,* Springer, Berlin, 1983, 877-881.

[3] L.K. Hua, H. Tong, *Some personal experiences in popularizing mathematical methods in the People's Republic of China,* Internat. J. Math. Ed. Sci. Tech., **13** (1982) 371-386.