Mechanics: China on the Horizon

By XIN Ling (Staff Reporter)

August 21, 2012 was a big day for ZHU Jinyang, a PhD student in fluid mechanics from Peking University. On that day, he presented his latest research findings in flow control, which he had prepared for quite a few months with two fellow students, to an audience of colleagues from different countries, and talked to some of the most distinguished scientists in his field. Participating in an International Congress of Theoretical and Applied Mechanics (ICTAM) was like a dream come true for him.

Indeed, ZHU was lucky to be able to join ICTAM, the highest academic conference and biggest get-together for mechanical scientists all over the world. The ICTAM meetings have been convened every four years, ever since the 1920s and almost without interruptions. In 2012, for the first time, it was held in China, offering Chinese mechanical students with a historic opportunity to open their eyes.

"Can't believe it! I can speak directly to the best scientists and exchange views with them," ZHU was very excited.

Also excited was DENG Weilin, a graduate student from the School of Mechanical Engineering, Tianjin University. On the opening day he took an early train from Tianjin to Beijing and rushed all the way into the conference room. "I'm here to meet a famous professor in solid mechanics from the United States. We had an appointment via email, and hopefully I haven't missed his speech this morning."

ZHU and DENG were among the 500 student participants

ICTAM2012's opening ceremony was held on August 20, 2012. The meeting attracted more than 1,500 scientists and students from all over the world.

The meeting was convened at the magnificent China National Convention Center in the Olympic Green of Beijing.

IUTAM President Timothy Pedley (left) gave out a present to BAI Yilong, President of ICTAM 2012 from the Institute of Mechanics, Chinese Academy of Sciences at the meeting's opening ceremony.

of the ICTAM Beijing meeting, nearly one third of the entire 1,560 attendees.

"Young people are the hope of mechanics. Some of them are smart enough to carry out outstanding researches even when they are graduate students. Therefore, despite the tight budget, we insist on encouraging students to participate and cutting their registration fee by half," said HU Haiyan, the meeting's treasurer and President of the Chinese Society of Theoretical and Applied Mechanics (CSTAM).

"The graduate students in China don't have enough opportunities to go abroad to attend international conferences. We hope they will take this chance to broaden their outlook, meet new colleagues, and even start new cooperation," HU added.

Of course, for such an important get-together held in China, the beneficiaries are by no means limited to students and young researchers. "The entire Chinese mechanical community has been longing for such a big communication platform," remarked LI Jiachun, an expert in fluid mechanics and former President of CSTAM.

According to the organizer's statistics, participants from China totaled up to around 600, accounting for nearly 40 percent of all participants. It is the result of the fast development of mechanics in China in recent years.

By far, CSTAM has more than 20,000 registered members, which is a feat considering that China's modern mechanics began only in the 1950s and was suspended for more than a decade due to domestic political turmoil.

"The world has witnessed the rapid expansion of mechanical community in China, and realized that China is going to play an important role in world mechanics", commented HE Yousheng, a professor of sea water dynamics from Shanghai Jiao Tong University and Member of the Chinese Academy of Engineering. "I think that's why the International Union of Theoretical and Applied Mechanics finally chose China to host the ICTAM meeting."

After joining the Union in 1980, China proposed to host an ICTAM meeting in 1988 and 2004 respectively, but lost by a neck to Israel and Australia. In 2008, days after the great success of Beijing Olympic Games, China finally won the bid to host the 2012 ICTAM meeting.

"For the Chinese mechanical community, it's a dream come true after two decades of endeavor," HU emphasized.

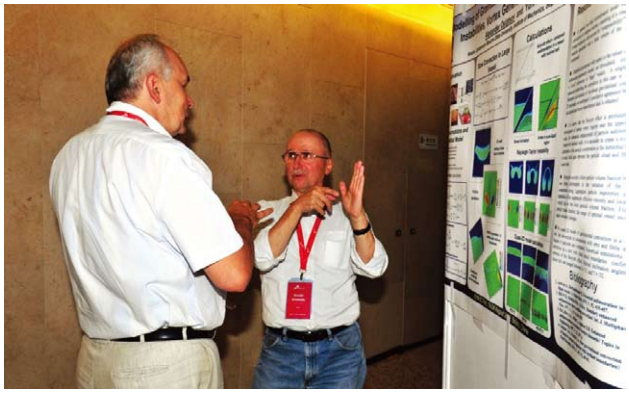
It is probably also a long-cherished wish for the founding fathers of Chinese mechanics, including QIAN Xuesen, ZHOU Peiyuan, QIAN Weichang and GUO Yonghuai who returned from the United States in the 1950s to build up modern mechanics in China from scratch.

"Today, more than 80 universities in China offer major programs in mechanics, and confer about 500 young people on PhD degree in mechanics every year." HU told the audience in his speech at the opening ceremony.

Many of the young people have grown into top-notch scientists. For instance, Prof. CHEN Shiyi, the speaker for the opening lecture on multiscale fluid mechanics and modeling, was a PhD graduating from Peking University in 1987 and today a renowned expert in computational fluid dynamics methodologies. Now, he works for the Department of Mechanical Engineering, Johns Hopkins University, and serves as the founding dean of the reestablished College of Engineering at Peking University.

"In recent years, China's mechanics has been making remarkable progresses with a galaxy of young scientists rising onto the international arena," CHEN remarked, and he was happy to see that "in some areas, they are already doing world-class research."

Lectures and interactions.



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HU echoed CHEN by saying that Chinese scientists are striving to keep up with the world in both theoretical and applied sectors. "As for papers, our quantity and frequency of quotation are among the best. As for application, mechanics has made substantial contributions to many big engineering projects in China, including the manned space flight, the lunar explorations, as well as the construction of the Three Gorges Dam, the Qinghai-Tibet Railway and the high-speed rail."

And as China looks ahead, it will definitely need mechanics to continue to help address its strategic and social needs, including probing the space and the sea, finding energy alternatives, combating natural disasters and improving people's health.

"We'll boost interdisciplinary studies that combine mechanics with biology, material sciences, environmental sciences and nanotechnology and so on. We'll also try to develop the equipment and facilities needed for such studies by ourselves. Probably in ten years' time, we can narrow down the gap between China and world leaders like the United States, Europe and Russia in the field of mechanics," said HONG Youshi, Vice President of CSTAM and former director of the Institute of Mechanics, Chinese Academy of Sciences.

No doubt, the Beijing meeting is an excellent chance for China to show the world its achievements and determination; it is going to be a milestone in the development of mechanics in this nation. However, senior mechanical scientists are well aware of issues China has to face if it is to become a real giant in the field.

One is the dilemma between theoretical and applied research. Some advocate for an emphasis on the applied fields. ZHENG Zhemin, an expert in explosion mechanics and Member of both the Chinese Academy of Sciences and the Chinese Academy of Engineering, said that China does need a small proportion of its mechanical scientists to address basic research, but more should deal with practical problems because "for mechanics and non-linear mechanics in particular, our number one goal was to solve engineering problems, and then to use the experience we gained to improve related theories". Some, however, suggested an equal importance in basic research.

Another issue China faces is similar to the one that has haunted the development of mechanics in many other nations: a lack of outstanding young talents coming into the discipline. "Most of the students with high marks choose to study 'hot' disciplines like biology and finance. In China, many people's understanding about mechanics is no more than the Newton's Laws of Motion," LI's concern was obvious.

"The two priorities for China's mechanical education are to enhance the quality of teaching and learning, and to inspire the love for mechanics among students," said LIU Renhuai, Vice President of CSTAM.

The future of mechanics in China rests with young researchers. YI Min, a PhD student in solid mechanics from Beihang University (or Beijing University of Aeronautics and Astronautics), was an attendee of the ICTAM Beijing meeting. He wrote down on his sciencenet blog that "Mechanics is not a popular science but a rigid discipline that requires no less precision than mathematics. Meanwhile, it is also engineering-oriented. To me it's so fascinating, both in theory and in practice. The ICTAM held in China was a golden opportunity for me to learn from and exchange ideas with many colleagues. When I saw the most famed scientists with my own eye and listened to their speeches with my own ear, I couldn't restrain my excitement as if I had seen the light, the hope."

ZHU was also ambitious. "As far as I know, many chief scientists who designed China's space flight projects had majored in mechanics. When I graduate, I will also devote myself to the space missions of my country."