Message to Professor Tsujimoto

I had known the name of Professor Tsujimoto since very many years ago through his remarkable achievements in the field of rotordynamics and cavitating flow in turbomachinery but I had not had close personal acquaintance with him before 2004.

In 2004, the local organizing committee was established to organize the 23rd IAHR Symposium in Yokohama which was to be held in 2006. In this committee, I served as an assistant to the chair of the committee, Professor Kurokawa of YNU, and Professor Tsujimoto was the chair of the paper screening sub-committee. Through the activity of this committee, I became to have closer contact with him. Then I knew that he had stayed before at EPFL-LMH and he was interested in various problems of hydroturbines through his contacts with Professor Avellan.

Since I had been engaged in R&D work on hydroturbines and pump-turbines in Toshiba for more than 40 years, the topics about hydroturbines were of common interest for both of us. Then I talked to him some problems of hydroturbines experienced in my career, which had not been fully explored yet. Among these problems were rotor-stator interaction and S-shaped characteristics of high head pump-turbines.

Then Professor Tsujimoto was very much interested in rotor-stator interaction and its phase resonance problem which could result in large pressure fluctuation in the spiral case and severe vibration of the whole machine.

In order to prevent severe pressure fluctuation in high head pump-turbines, it is essential to avoid phase resonance. But, before that time, it had been explained only by a simple one dimensional theory, which had not been verified by experimental study or systematic analysis. Professor Tsujimoto noticed that the acoustic velocity in air is much lower than that in water and the phase resonance problem observed at high head pump-turbines could be simulated by experiments using a small blower. Then he conducted extensive studies using a small blower dismantled from a vacuum cleaner to explore the phase resonance problem. Through these experiments and sophisticated mathematical analysis, he finally clarified the behavior of this phenomenon in detail.

Through his studies on this, I have been impressed so deeply by his flexible thinking to use a small blower to explore the problem of large pump-turbines and his enthusiastic attitude toward thorough exploration of the problem.

On the other topic about S-shaped characteristics of pump-turbines, he is still promoting a research project to investigate it and to mitigate the instability problem caused by it.

His retirement is really a big loss for the turbomachinery society in Japan. Upon his retirement, I would like to express my sincere gratitude for his valuable contributions made so far and I hope he continue to guide the young researchers in our turbomachinery society.

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