Journal of Fluids Engineering

Guest Editorial

18th International Symposium on Transport Phenomena and Dynamics of Rotating Machinery (ISROMAC18)

Rotating machinery plays a preponderant role in most of the industrial sectors, including, but not limited to, energy production and storage, automobile, maritime transport, aviation, and aerospace. Since the first development of the water wheel a few thousand years ago, modern rotating machines have been developed during the past century for various applications, as rocket engine turbopumps, hydraulic and gas turbines, marine propellers, compressors, turbochargers, ventilators and blowers, marine and wind turbines. Despite the high level of efficiency and reliability of these systems, major innovations and developments are still present in the area of rotating machinery. Current challenges concern noise reduction, notably in the field of aviation, low-carbon power generation through the development of new renewable energy technologies (e.g., wind and marine energy) and the improvement of the efficiency of existing technologies, improvement of the flexibility and reliability of rotating machines in off-design operations where they may face aggressive flows and instabilities. Addressing all these issues requires skills in various fields, including combustion, heat transfer, fluid-structure interaction, multiphase flow, aero-acoustics and hydro-acoustics, rotor dynamic, advanced optimization. In addition, the increasing complexity of industrial systems and technologies, together with the new requirement in term of industry decarbonization, make the optimization of rotating machinery and the understanding and control of internal flows more and more challenging, requiring the development of ground-breaking advanced numerical modeling and experimental techniques.

In this context, the International Symposium on Transport Phenomena and Dynamics of Rotating Machinery (ISROMAC) conference is one of the few well-established international meetings devoted to rotating flows and rotating machinery. It is organized every two years in Hawaii since 1985, and it has become for a large part of the scientific community a regular objective to present up to date research and achievements. Although the Pacific Center of Thermal-Fluids Engineering, which has created the conference and has been continuously involved in its organization, initially targeted the Pacific Basin as the primary audience, the conference now also attracts participants from many countries worldwide.

The 18th ISROMAC symposium was supposed to be held in Honolulu, Hawaii, U.S., at the Hawaii Convention Center in April 2020. However, due to the COVID19 pandemic, the organizing committee was forced to postpone the symposium and finally decided to organize it online from November 23 to 26, 2020. In these extraordinary circumstances, the conference was held online successfully and was attended by 190 participants, including academic and industrial researchers from 19 countries in America, Asia, Europe, and Oceania. 137 papers were presented in the symposium, divided into 20 sessions focusing on different topics related to rotating machinery. A wide breath of topics related to the dynamics of rotating machinery was presented, including compressors, turbines, pumps and other fluid machinery, multiphase flows, cavitation, rotor-dynamics, heat transfer, combustion, aero-acoustics, CFD, and experimental techniques applied to turbomachines.

All the papers were thoroughly reviewed by international experts, leading to the selection of 13 papers for this Special Issue in ASME *Journal of Fluids Engineering*. These works are related to advanced and multiphysics CFD, cavitation and multiphase flows, heat transfer, compressors and fans, liquid rocket engines, steam and gas turbines, pumping machinery, fluid-structure interaction, marine energy, hydraulic machines, turbocharging systems.

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