applied sciences

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Editorial

Special Issue on Rotor Dynamics: Theoretical Analysis, Computer and Experimental Modelling, Measurements

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Rotors and shafts are essential, often used, and highly loaded components of rotating machines and machine devices. For this reason, their behavior has been studied for hundreds of years. The properties of rotors depend on many geometric, design, operational, and material parameters, like the kind of support elements, material, internal and external damping, critical speeds, and many others. The failures of aircraft motors, turbines, high-speed turbo-compressors, or generators can cause enormous material damage or even claim lives. This, together with the current technological development, application of new materials, safety rules, and requirements placed on the operation of rotors in harsh environments like very high or low temperatures, vacuum, or environments containing abrasive dust or aggressive chemicals, require to continue in investigations of their dynamical behavior.

Therefore, the main goals of the Special Issue on Rotor Dynamics: Theoretical Analysis, Computer and Experimental Modelling, and Measurements were aimed at the latest trends in the theoretical research, development, monitoring, vibration investigation, fatigue, and service life analysis, usage of new materials and technologies, new areas of their application, and fresh designs, manufacturing, operation conditions, and maintenance processes.

Seven research papers in various fields of rotor dynamic and rotating machines are presented in the Special Issue. Chun-Jung Huang et al. [1] investigated computationally the influence of mutual coupling effects between the shaft and the bearing system on the ball end milling process. The research of Moczulak et al. [2] was focused on an experimental study of foil bearings lubricated by low-boiling medium applicable in the field of microturbines. The conducted research showed that the operating characteristics are highly dependent not only on the used material and bearings' geometry but also on the surface roughness of the mating parts. Sarrazin and Liebich [3] concentrated their study on conical foil bearings. Their work's novel findings show that the investigated bearings' proper functionality requires a non-uniform bearing clearance and identification of the critical axial force for operation stability. Betti et al. [4] dealt with the tilting pad journal bearings, their modeling, and their effect on the dynamical behavior of rotors. Schilling and Liebich [5] conducted experimental research on the influence of a nominal bearing clearance on the lift-off behavior and the load-carrying capacity of gas polymer bearings. Molčan et al. [6] performed a computational study of a rigid rotor connected to the stationary part by squeeze film dampers. The authors identified several basins of attraction depending on initial conditions. The research results indicate that the rotor system can exhibit a synchronous circular response with an enormous orbit radius and a nonsynchronous response with a quasiperiodic character. Liang Li et al. [7] dealt with balancing rigid rotors rotating at variable speeds.

Although submissions for this Special Issue have been closed, extensive research in the field of rotor dynamics continues. Its goal is to meet rising technological requirements placed on rotating machine design, increasing their safety, reliability, and environmental friendliness. The published articles will contribute to the work of researchers, academic workers, and engineers in mechanical, material, electrical, control, aeronautics, and

Citation: Zapoměl, J. Special Issue on Rotor Dynamics: Theoretical Analysis, Computer and Experimental Modelling, Measurements. *Appl. Sci.* **2023**, *13*, 11551. https://doi.org/10.3390/app132011551

Received: 13 October 2023
Accepted: 16 October 2023
Published: 22 October 2023

aerospace engineering. The new ideas will contribute to the development of knowledge in classical and newly emerging areas like flywheels for energy storage, energy harvesting, cryogenic machines, or micro and nano rotor dynamics.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Acknowledgments: Thanks to all the authors and peer reviewers for their valuable contributions to this Special Issue 'Rotor Dynamics: Theoretical Analysis, Computer and Experimental Modelling, Measurements'. The gratitude belongs to all the staff and people involved in this Special Issue.

Conflicts of Interest: The author declares no conflict of interest.

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