

Computational Techniques of Rotor Dynamics with the Finite Element Method

— Second Edition



CRC Press
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Arne Vollan and
Louis Komzsik

Computational Techniques Of Rotor Dynamics With The Finite Element Method

Louis Komzsik



Computational Techniques Of Rotor Dynamics With The Finite Element Method:

Computational Techniques of Rotor Dynamics with the Finite Element Method Arne Vollan, Louis Komzsik, 2012-03-13 For more than a century we have had a firm grasp on rotor dynamics involving rigid bodies with regular shapes such as cylinders and shafts. However, to achieve an equally solid understanding of the rotational behavior of flexible bodies, especially those with irregular shapes such as propeller and turbine blades, we require more modern tools and methods. *Computational Techniques of Rotor Dynamics with the Finite Element Method* explores the application of practical finite element method (FEM) based computational techniques and state-of-the-art engineering software. These are used to simulate behavior of rotational structures that enable the function of various types of machinery, from generators and wind turbines to airplane engines and propellers. The book's first section focuses on the theoretical foundation of rotor dynamics, and the second concentrates on the engineering analysis of rotating structures. The authors explain techniques used in the modeling and computation of the forces involved in the rotational phenomenon. They then demonstrate how to interpret and apply the results to improve fidelity and performance. Coverage includes: Use of FEM to achieve the most accurate computational simulation of all gyroscopic forces occurring in rotational structures; Details of highly efficient and accurate computational and numerical techniques for dynamic simulations; Interpretation of computational results which is instrumental to developing stable rotating machinery; Practical application examples of rotational structures' dynamic response to external and internal excitations; An FEM case study that illustrates the computational complexities associated with modeling and computation of forces of rotor dynamics; Assessment of propellers and turbines that are critical to the transportation and energy industries. Useful to practicing engineers and graduate-level students alike, this self-contained volume also serves as an invaluable reference for researchers and instructors in this field. CRC Press. Authors: Speak. Louis Komzsik introduces you to two books that share a common mathematical foundation: the finite element analysis technique. Watch the video.

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book is composed of two parts the first focusing on the theoretical foundation of rotor dynamics and the second focusing on the engineering analysis of industrial structures The theoretical foundation is built on physics calculus and finite element technology chapters Computational and numerical techniques provide free vibration and response analyses solutions The industrial engineering analysis part contains chapters analyzing jet engine turbine wheels aircraft propellers and wind turbine blades This book concludes with a new industrial case study based on a recent modern wind turbine development project

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diverse range of backgrounds It is a self contained textbook that shows how to progress from the basics of fluid mechanics to modern wind turbine blade design It presents the fundamentals of fluid dynamics and inflow conditions as well as extensive information on theories describing the aerodynamics of wind turbines After examining a number of related experiments the book applies the lessons learned to blade design The text of this 3rd edition has been thoroughly revised and the book includes a new section on aerodynamic design and optimization *Proceedings of the 7th China Aeronautical Science and Technology Conference* Chinese Soc. of Aeronautics&Astronautics,2025-03-28 This book contains the selected papers from the 7th China Aeronautical Science and Technology Conference Topics include but are not limited to key technologies for aircraft including fixed wing rotorcraft new concept aircraft etc design and overall optimization aerodynamics flight mechanics structural design advanced aviation materials including composite materials advanced aviation manufacturing and design and overall optimisation aerodynamics and flight mechanics structural design advanced aeronautical materials including composite materials advanced aeronautical manufacturing technology advanced aeronautical propulsion technology navigation guidance and control technology airborne systems electromechanical technology environmental control life saving technology key technologies for multi electric aircraft and all electric aircraft aviation testing technology critical technologies in the vicinity of space vehicles unmanned aerial vehicles and related technologies general aviation flight safety civil aviation transportation and air quality aviation science and technology and industrial development policy and planning other related technologies Make this book a valuable resource for researchers engineers and students

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