

Lecture Notes in Physics

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L. Ting R. Klein

Viscous Vortical Flows



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Viscous Vortical Flows

James F. Campbell



Viscous Vortical Flows:

Viscous Vortical Flows Lu Ting, Rupert Klein, 2014-03-12 This is a comprehensive account of the asymptotic theory of slender vortices with diffusion cores Addressed to both graduate students and researchers it describes the mathematical model and its numerical analysis The asymptotic analysis involves two length and two time scales Consistency conditions and time invariance of moments of vorticity are given and applied to numerical solutions The authors also describe consistency conditions between the large circumferential and axial velocity in the core Vortical Flows Jie-Zhi Wu, Hui-Yang

Ma, Ming-De Zhou, 2015-06-23 This book is a comprehensive and intensive book for graduate students in fluid dynamics as well as scientists engineers and applied mathematicians Offering a systematic introduction to the physical theory of vortical flows at graduate level it considers the theory of vortical flows as a branch of fluid dynamics focusing on shearing process in fluid motion measured by vorticity It studies vortical flows according to their natural evolution stages from being generated to dissipated As preparation the first three chapters of the book provide background knowledge for entering vortical flows The rest of the book deals with vortices and vortical flows following their natural evolution stages Of various vortices the primary form is layer like vortices or shear layers and secondary but stronger form is axial vortices mainly formed by the rolling up of shear layers Problems are given at the end of each chapter and Appendix some for helping understanding the basic theories and some involving specific applications but the emphasis of both is always on physical thinking Vortex

Dominated Flows Lu Ting, Rupert Klein, Omar M Knio, 2007-07-05 This monograph provides in depth analyses of vortex dominated flows via matched and multiscale asymptotics and demonstrates how insight gained through these analyses can be exploited in the construction of robust efficient and accurate numerical techniques The book explores the dynamics of slender vortex filaments in detail including fundamental derivations compressible core structure weakly non linear limit regimes and associated numerical methods Similarly the volume covers asymptotic analysis and computational techniques for weakly compressible flows involving vortex generated sound and thermoacoustics The book is addressed to both graduate students and researchers **Vortical Flows Research Program of the Fluid Dynamics Research Branch**, 1986

Unsteady Viscous Vortex with Flow Toward the Center Robert G. Deissler, 1965 **Analysis of Selected Problems**

Involving Vortical Flows Leonard Roberts, 1985 Vortex Flows at Supersonic Speeds Richard M. Wood, 2003

Three-dimensional Interactions and Vortical Flows with Emphasis on High Speeds David J. Peake, Murray Tobak, 1980

Scientific and Technical Aerospace Reports, 1989 **On Issues Concerning Flow Separation and Vortical Flows in 3 Dimensions**, 1983 **Computational Aerodynamics of Ordered Vortex Flows** H. W. M. Hoeijmakers, 1989

Theoretical and Experimental Investigations of Three-dimensional Viscous Vortex Flows Coleman duP. Donaldson, Roger D. Sullivan, AND Richard S. Snedeker, AERONAUTICAL RESEARCH ASSOCIATES OF PRINCETON INC N J., 1963 The research efforts carried out at ARAP during the past five years in the field of viscous vortex motions are

summarized The work cited constitutes a rather extensive program of theoretical and experimental studies of vortex motions in general and of three dimensional laminar and turbulent incompressible driven vortices in particular The theoretical studies fall into three general categories the first and most important comprising velocity distributions for steady laminar motion the second dealing with unsteady velocity characteristics and the third treating temperature distributions for the steady motions first considered An evaluation and discussion of the effects of turbulence in real flows of the general type under consideration is included The work performed and the results and conclusions reached in each of the areas of study already mentioned are discussed Author *Vortex Flow Aerodynamics, Volume 1* James F. Campbell,1986

Three-dimensional Vortex-body Interaction in a Viscous Fluid Jeffrey S. Marshall,1999 An experimental and computational study of the impact of a vortex with a body oriented normal to the vortex axis was performed Particular focus was placed on understanding characteristics of the secondary vorticity ejected from the body and the interaction of the secondary vorticity with the primary vortex Since both onset of boundary layer separation and the form of the secondary vorticity structures are sensitive to variation of the velocity normal to the body axis the effect of normal velocity on vortex body interaction was carefully examined The physical features of the flow evolution were categorized in terms of an impact parameter and a thickness parameter which respectively represent ratios of velocity and length scales associated with the vortex to those associated with the flow in the absence of the vortex Experiments were performed using a combination of laser induced fluorescence LIF flow visualization and particle image velocimetry PIV in a water tank to examine the form of the secondary vorticity structures with both high and low values of the impact parameter for normal vortex interaction with a circular cylinder and with a thin blade A new type of Lagrangian vorticity method based on a tetrahedral mesh was developed and applied to compute the secondary vorticity evolution during vortex cylinder interaction Computations were also performed for model problems to examine in detail wrapping of a vortex loop around a columnar vortex and impulsive cutting of a columnar vortex with finite axial flow **Journal of the Royal Aeronautical Society** ,1923 **Eddy**

Structure Identification J.P. Bonnet,1996-06-04 This book is a unique opportunity to present in a single volume information that is needed for both experimentalists theoreticians and computationalists for the detection analysis prediction and control of eddy structures in turbulent shear flows Major identification techniques of Eddy Structures in Turbulent Shear Flows are presented together with applications to vortex dynamics turbulence management and flow control for experimental and numerical applications with new prediction methods Education Schemes Proper Orthogonal Decomposition Stochastic Estimation Pattern Recognition Analysis Wavelet Transform Illustrations of the use of the different methods are given

Vortex Flow Aerodynamics James Franklin Campbell,Russell F. Osborn,Jerome T. Foughner,1986 The Journal of the Royal Aeronautical Society Royal Aeronautical Society,1923 **A Review of Confined Vortex Flows** W. S. Lewellen,1971

Proceedings of the ... Congress of the International Council of the Aeronautical Sciences International Council

of the Aeronautical Sciences. Congress, 1988

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