

N. A. Fomin

SPECKLE PHOTOGRAPHY FOR FLUID MECHANICS MEASUREMENTS



Springer

Speckle Photography For Fluid Mechanics Measurements

Wilfried Staude



Speckle Photography For Fluid Mechanics Measurements:

Speckle Photography for Fluid Mechanics Measurements Nikita A. Fomin, 2013-03-09 Speckle photography is an advanced experimental technique used for quantitative determination of density velocity and temperature fields in gas liquid and plasma flows This book presents the most important equations for the diffraction theory of speckle formation and the statistical properties of speckle fields It also describes experimental set ups and the equipment needed to implement these methods Speckle photography methods for automatic data acquisition and processing are considered and examples for their use are given

Fluid Mechanics Measurements R. Goldstein, 2017-11-13 This revised edition provides updated fluid mechanics measurement techniques as well as a comprehensive review of flow properties required for research development and application Fluid mechanics measurements in wind tunnel studies aeroacoustics and turbulent mixing layers the theory of fluid mechanics the application of the laws of fluid mechanics to measurement techniques techniques of thermal anemometry laser velocimetry volume flow measurement techniques and fluid mechanics measurement in non Newtonian fluids and various other techniques are discussed

Laser-Strophometry Wilfried Staude, 2003-07-01 This book is the result of two decades of research work which started with an accidental observation One of my students Dipl phys Volkmar Lenz noticed that the speckle pattern of laser light scattered by a cuvette containing diluted milk performed a strange motion every time he came near the cuvette with his thumb After thinking about this effect we came to the conclusion that this motion can only be caused by scattering particles with different velocities as in the case of the diffraction pattern of an optical grating A linear motion of the grating does not change the pattern whereas a rotation of the grating does The observed speckle motion could then be explained qualitatively as produced by the inhomogeneous velocity of the convection within the cuvette which was produced by the heat of the thumb The theoretical treatment of this effect revealed that the velocity gradient of the light scattering medium is responsible for the speckle motion The idea to use this effect for developing measurement techniques for velocity gradients arose almost immediately For that purpose we had to develop not only experimental set ups to measure the pattern velocity but also the theory which describes the connection between this velocity and the velocity gradient The result of this work together with the description of a method developed by another group forms the contents of this book I am indebted to the students who worked in my laboratory and developed the measurement techniques These were in temporal order Dr

Particle Image Velocimetry Ronald J. Adrian, Jerry Westerweel, 2011 Particle image velocimetry or PIV refers to a class of methods used in experimental fluid mechanics to determine instantaneous fields of the vector velocity by measuring the displacements of numerous fine particles that accurately follow the motion of the fluid Although the concept of measuring particle displacements is simple in essence the factors that need to be addressed to design and implement PIV systems that achieve reliable accurate and fast measurements and to interpret the results are surprisingly numerous The aim of this book is to analyze and explain them comprehensively

Interferometry Mithun Bhowmick, Bruno Ullrich, 2019-08-28 The

authors provide an overview of recent developments in the field of interferometry To achieve this aim a broad range of topics is presented by experts who have summarized recent results drawn from theory and experiments The simplicity and versatility of interferometry technique can be easily seen in the broad range of problems discussed in the text This important book project presents recent unique updates on interferometry *Experimental Aerodynamics* Stefano Discetti,Andrea Ianiro,2017-03-16 *Experimental Aerodynamics* provides an up to date study of this key area of aeronautical engineering The field has undergone significant evolution with the development of 3D techniques data processing methods and the conjugation of simultaneous measurements of multiple quantities Written for undergraduate and graduate students in Aerospace Engineering the text features chapters by leading experts with a consistent structure level and pedagogical approach Fundamentals of measurements and recent research developments are introduced supported by numerous examples illustrations and problems The text will also be of interest to those studying mechanical systems such as wind turbines **Optical Interferometry** Alexandr Banishev,Jue Wang,Mithun Bhowmick,2017-02-15 Optical methods of measurements are the most sensitive techniques of noncontact investigations and at the same time they are fast as well as accurate which increases reproducibility of observed results In recent years the importance of optical interferometry methods for research has dramatically increased and applications range from precise surface testing to finding extrasolar planets This book covers various aspects of optical interferometry including descriptions of novel apparatuses and methods application interferometry for studying biological objects surface qualities materials characterization and optical testing The book includes a series of chapters in which experts share recent progress in interferometry through original research and literature reviews *Dynamics of Droplets* Arnold Frohn,Norbert Roth,2013-04-17 Intended to provide an up to date overview of the field this book is also likely to become a standard work of reference on the science of droplets Beginning with the theoretical background important for droplet dynamics it continues with a presentation of the various methods for generating single droplets and regular droplet systems Also included is a detailed description of the experimental methods employed in droplet research A special chapter is devoted to the various types of droplet interactions without phase transition A separate chapter then treats many examples of the possible phase transition processes The final part of the book gives a summary of important applications With its comprehensive content this book will be of interest to all scientists and lecturers concerned with two phase flow spray technology heterogeneous combustion and aerosol science **Modelling with Transparent Soils** Magued Iskander,2010-07-15 up with automated systems for assessment of road condition For example Haas et al 1997 developed an automated algorithm for detecting cracks and joints con tion Smith and Lin 1997 developed a fuzzy logic classification scheme for pavement distress condition Oh et al 1997 developed iterative algorithm for overcoming noisy images of roads due to shadows and low light conditions Koustopoulos and Mishalani 1997 presented a model for distress assessment in a local microscopic and global macroscopic level using captured images of pavement Lee

1993 presented a comparison between 15 different imaging algorithms used in crack detection Ground Penetration Radar GPR has also been used for pavement assessment Special computer algorithms were developed for quick analysis of GPR data Adeli Hung 1993 and Maser 1996 Heiler and McNeil 1997 proposed a modified system for analyzing the GPR data using an artificial neural network ANN 2 3 2 Traffic Analysis and Control Currently imaging systems provide essential data for transportation and traffic engineering planning Anon 1999 Machine vision techniques were introduced to intersection traffic signal control in the late 1970 s Chou and Sethi 1993 No days many systems have been developed all over the world for traffic analysis and control applications in addition to image based systems for traffic violations Nallamathu and Wang 1997 developed one of the first automated systems for license plate recognition using character recognition algorithm for the use in monitoring violators at toll stations and many other traffic applications *Advanced Biophotonics* Ruikang K. Wang,Valery V Tuchin,2016-04-19 Despite a number of books on biophotonics imaging for medical diagnostics and therapy the field still lacks a comprehensive imaging book that describes state of the art biophotonics imaging approaches intensively developed in recent years Addressing this shortfall *Advanced Biophotonics Tissue Optical Sectioning* presents contemporary methods and

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