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VON KARMAN INSTITUTE FOR FLUID DYNAMICS
CHAUSSÉE DE WATERLOO, 72
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DIGITAL IMAGE PROCESSING IN FLUID DYNAMICS

MARCH 5-9, 1984

LECTURE SERIES DIRECTOR : J-M. BUCHLIN

FOREWORD

Digital image processing is a new branch of signal processing which becomes increasingly important with the improvement of digital computer capabilities. It offers to scientists a powerful tool for the extraction of quantitative information from image utilization. Digital image processing already has many applications in industry, biomedicine and space exploration. One recent application of DIP which is developing rapidly, is in the field of fluid mechanics, where flow visualization plays a prominent part. The objective of this lecture series is to present a concise state of the art review of the basic and practical aspects of digital image processing with emphasis on fluid flow analysis.

After an opening lecture introducing the general features of digital image processing, a session was devoted to discussion of the fundamental considerations : the human visual system and the digital representation of images were described.

Following lectures dealt with early optical processing techniques including numerical filtering, the Fourier transform and Matrix-Vector-algorithm methods.

Aspects of hardware selection, calibration procedure and compression and display of information were also considered and illustrated.

Several lectures were devoted to pattern recognition, tomography with applications to 3D visualization and real-time holography based on non-linear optics.

Selected topics in fluid dynamics related to atmospheric dispersion, combustion problems, turbulent structure formation and mixing layers attempted to demonstrate the potential of digital image processing for the determination of multidimensional concentration and velocity fields.

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List of Participants
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PRATT, W.K. - VICOM Systems Inc., USA :
Digital image processing and analysis

HESSELINK, L. - Stanford U., USA :
Optical processing

JIMENEZ, J. - IBM Scientific Centre, Madrid, Spain :
- Planning an experiment for digital image processing
- Post-processing : extracting and displaying useful information from digital images

SCHON, J.P. - Ecole Centrale de Lyon & U. de St Etienne, France :
Instantaneous concentration and velocity measurements through laser visualization associated with a digital processing system

MEYNART, R. - VKI & U. Libre de Bruxelles; Senior Assistant FNRS
and LOURENÇO, L.M. - VKI :
Laser speckle velocimetry in fluid dynamics applications

von Karman Institute for Fluid Dynamics

Lecture Series

Digital Image Processing in Fluid Dynamics

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