

PROCEEDINGS OF THE EIGHTH ASIAN CONGRESS OF FLUID MECHANICS

December 6 - 10, 1999

Shenzhen, China



Editor in Chief: Erjie Cui

International Academic Publishers

ISBN 7-80003-459-3



9 787800 034596 >

图书在版编目 (CIP) 数据

流体力学：第八届亚洲流体力学学术会议论文集：英文
/崔尔杰编. -北京：万国学术出版社，1999. 11
ISBN 7-80003-459-3

I. 流… II. 崔… III. 流体力学-国际学术会议-文集-
英文 IV. 035-53

中国版本图书馆 CIP 数据核字 (1999) 第 65304 号

Published and Distributed by
International Academic Publishers
137 Chaonei Dajie, Beijing 100010
The People's Republic of China

Copyright © 1999 by International Academic Publishers

The book has been photographically reproduced from the best available copy. The papers were not refereed but were reviewed for their technical contents. Editing was restricted to matters of format, general organization and retyping.

The editors assume no responsibility for the accuracy, completeness or usefulness of the information disclosed in this volume. Unauthorized use might infringe on privately owned patent or publication right. Please contact the individual authors for permission to reprint or otherwise use information from their papers.

First edition 1999

Cui Erjie

Proceedings of the Eighth Asian Congress of Fluid Mechanics

EDITORIAL COMMITTEE

Chairman: Erjie Cui (China)

Members: M. Kiya (Japan) T.S. Prahlaad (India) Mao Sun (China)

Technical Editors

Lin He

Yanan Tang

Dagang Zhao

Copies of the Proceedings are available from

Mr. Lin HE

The Chinese Society of Theoretical
and Applied Mechanics

No.15, Zhong-guan-cun Road

Beijing 100080, China

E-mail: cstam@sun.ihep.ac.cn, lxjz@imech.ac.cn

FAX: (86 10) 6255 9588, 6256 1284

THE HISTORY OF ACFM

1ACFM	India	1980
2ACFM	China	1983
3ACFM	Japan	1986
4ACFM	Hong Kong	1989
5ACFM	Korea	1992
6ACFM	Singapore	1995
7ACFM	India	1997
8ACFM	China	1999

PREFACE

The first Asian Congress of Fluid Mechanics was initiated in 1980 in Bangalore, India. Up to now, seven congresses were held and the congresses have always been an important event for the Asian fluid mechanics community.

Following the objectives of these congresses, the aim of the present one, the Eighth Congress, in Shenzhen, China, is to promote contacts and to provide an opportunity for the fluid dynamicists from Asia as well as from all over the world to exchange informations, ideas and experiences in various areas of fluid mechanics research and applications.

The response from the fluid mechanics world was quite encouraging. Six invited plenary lectures, fourteen special lectures and more than 200 contributed papers from twenty different countries and regions have been received. The papers selected, collected and offered to the readers are the best of the scientific production in our field during the past several years. They cover a wide range of interesting topics like turbulence and turbulence modelling; instability and transition; separated flows, jets and mixing layers; free surface flows and waves; flow acoustics; aerospace fluid dynamics; vortical flows; computational fluid dynamics; flow control; multiphase flows and non-Newtonian flows; convective flows; internal flows; combustion and reacting flows; industrial flows; environmental flows; hydraulic flows and hydraulics; experimental techniques; etc..

Compilation of such a broad covered proceedings has to be a collaborative effort. The editorial committee tried his best to fulfill his responsibility. As a result of hard works, it is now in your hands. We wish to take this opportunity to express our hearty gratitude to the plenary and special lecturers, to the authors who have submitted papers and to those who have helped in reviewing and editing the papers and in the publication of the proceedings for their contribution, patience and excellent work, respectively.

We would also like to express our sincere thanks to the members of the Asian Fluid Mechanics Committee and the Local Organizing Committee, as well as the sponsoring societies and agencies, whose support and cooperation have certainly assured the success of this congress.

Erjie Cui



Shenzhen, China
December, 1999

THE EIGHTH ASIAN CONGRESS OF FLUID MECHANICS
December 6-10, 1999, Shenzhen, China

TABLE OF CONTENTS

PLENARY LECTURES

Current Status of Kinetic Numerical Schemes S M Deshpande.....	3
Control of Boundary-Layer Instabilities by Active Means M Gaster.....	7
The Influence of Energy Release in Electrical Discharge Regions near Flying Bodies on Their Aerodynamic Characteristics G G Chernyi.....	11
Multi-Scale Complex Flow Fields and Numerical Simulation of Turbulent Flow F G Zhuang.....	12
Anisotropy in Turbulence: Theory, Experiments and Simulations I Procaccia.....	14
Vorticity Manipulation as an Effective Means for Aerodynamic Noise Suppression M Nishioka.....	15

SPECIAL LECTURES

Impact of Computational Fluid Dynamics on the Analysis and Design of Air and Space Vehicles R Agarwal.....	19
Reynolds Number Dependence of Turbulence R A Antonia, B R Pearson, T Zhou.....	33
On the Behaviour of Hot Fluids in the Presence of Magnetic Field M Banerjee.....	39
Boundary-Layer Stability and Transition over Flexible Surfaces P W Carpenter.....	43
Review of Compressible Dynamic Stall and Its Control M S Chandrasekhara.....	47
Theoretical Studies on Swept-Wing Transition J D Crouch.....	51
Transitions of Flow Regimes of Circular Cylinder N W M Ko, C W Law, K W Lo.....	55
Flow-Acoustic Interaction in Supersonic Jets A Krothapalli.....	60
Stability of Flow Past Soft Materials V Kumaran.....	65

An Experimental Study and Analysis on Complex Shock Wave/Boundary Layer Interactive Flows Induced by Protuberances at Hypersonic Speed S X Li.....	69
Turbulence Modelling for Low Speed Flows — An Overview of the Current Status S Majumdar.....	75
Advances in the Study of Nonlinear Stability Problems in Geophysical Fluid Dynamics by Energy-Casimir Method M Mu.....	79
Numerical Prediction of Locally-Forced Turbulent Separated and Reattaching Flow G H Rhee, H J Sung.....	83
A Study on the Mechanism of High-Lift Generation by an Airfoil in Unsteady Motion at Small Reynolds Number M Sun, H Hamdani.....	87

CONTRIBUTED PAPERS

A. TURBULENCE AND TURBULENCE MODELLING

Structures in High-Reynolds Number Turbulent Boundary Layers Y Iwadate, K Morita, A Hirota, Y Yokokawa, Y Fukunishi, H Sato.....	99
Extended Self-Similarity in Wall Turbulence N Jiang, Z D Wang, W Shu.....	103
A Lagrangian Turbulence Model M Kiya, S Izawa.....	108
Vortex Row Model of a Turbulent Boundary Layer Y Kobashi, M Hayakawa.....	112
The 3D Spiral Structure Pattern in the Atmosphere S D Liu, G J Xin, S K Liu, F M Liang.....	116
A Theoretical Way to Near-Wall Turbulence Closure L P Lu, M Z Chen.....	121
On the Separations of the Pressure Fluctuation Terms in the Turbulent Transport Equations Z M Lu, Y L Liu.....	125
Understanding Compressible Turbulence through Direct Numerical Simulation K H Luo.....	129
Self-Preserving Forms of Turbulent Spots in Channels J Mathew, A Das.....	133
Power Spectrum of a Passive Scalar in Turbulent Flows J Mi.....	137
Turbulence Structure under Sheared-Wavy Liquid Interface M Nasr-Esfahany.....	141
R_λ Behaviour of Spectra and 2nd-Order Structure Functions in Turbulent Shear Flows B R Pearson, R A Antonia.....	145

Experimental Study on the Coherent Structures and Chaotic Phenomena of Axisymmetric Countercurrent Shear Flows X L Xie, W W Ma, H L Zhou.....	149
Scaling of Mixed Longitudinal-Transverse Velocity Structure Functions G Xu, R A Antonia, S Rajagopalan.....	153
The Effect of Wake Interactions on the Turbulent Prandtl Number H J Zhang, Y Zhou, R M C So, M H Liu.....	157
Testing Investigation for Turbulent Jet Using PDPA Techniques W Z Zhang, S J Zhang, D Wang.....	162
Comparison between Different Estimates of Turbulent Dissipation Rates for Either Energy or Temperature T Zhou, R A Antonia.....	167
Comparison between Temporal and Spatial Transverse Velocity Increments in a Turbulent Shear Flow T Zhou, B R Pearson, R A Antonia.....	171
 B. INSTABILITY AND TRANSITION	
Investigation of Synthetic Diagnosis Technique of Boundary Layer Y Z Bian, T J Xu, J C Fan, J P Ma, X Tu, C R Bai, K M He, D Y Yin, Z F Zhao.....	177
Coupling between Separated Shear Layer and Acoustic Forcing Y F Dong.....	181
Instability and Nonlinear Evolution of a Swirling Jet G H Hu, D J Sun, X Y Yin, J Z Wu.....	186
The Validity of Tangent Linear Model with Nonlinear Stable and Unstable Basic Flows M Mu, H Guo, J F Wang, Y Li.....	190
Rayleigh-Taylor Instability in a Non-Newtonian Fluid N Rudraiah, P Sridharan.....	194
Multiple Convective Instabilities in Double Diffusive Magnetoconvection I S Shivakumara.....	198
 C. SEPARATED FLOWS, JETS AND MIXING LAYERS	
Bubble Dynamics in Jet Aeration System A Ahmed.....	205
Solution of Supersonic Flow over Blunt Geometries M Boroomand, S M H Karimian, A Nejat.....	209
Numerical Study on Vortex Interactions behind Two Unequal Circular Cylinders V S Y Cheng, N W M Ko.....	213
Acceleration of Pairing Structures in an Unexcited Circular Jet K K Chow, N W M Ko.....	217
Measurements of Step Cylinder with Two Aspect Ratios L P Chua, S C M Yu, S C Poon.....	221

Study on the Transportation of Passive Scalar in Shearless Turbulence Mixing Layer G X Cui, Z S Zhang, C X Xu, L Shao, J P Bertoglio.....	226
Numerical Investigation of Flow around Two Natural Draft Cooling Towers in Tandem Arrangement S Fu, Z Q Zhai.....	230
Interference Effects on the Flow Induced Oscillations of a Square Cylinder B H L Gowda, R A Kumar.....	234
Experimental Study of a Planar Jet Excited by Symmetric and Antisymmetric Disturbances M Hayakawa, R Morishima, S Iida.....	238
On the Prediction of Vortex Shedding Flow Past a Square Cylinder in a Uniform Shear Flow A K M S Islam.....	242
Vorticity Transport and Circulation Decay of a Jet in Crossflow V Kolář, E Savory, N Toy.....	247
A Model for the Reattachment of an Inclined Two-Dimensional Wall Jet J C S Lai, D Lu.....	251
Vorticity Measurements in the Near Wake of a Circular Cylinder at Low Aspect Ratio C W Law, N W M Ko.....	255
On the Turbulent Mixing Flow Characteristics of a Multi-Hole Diesel Nozzle Spray S G Lee, J K Lee, B J Rho.....	259
A Device for Studying the Stochastic Behaviour of Bubbles Interacting with Compliant Wall S C Li, P W Carpenter.....	263
A New Mechanism on the Transitions in the Subcritical Regime of a Smooth Cylinder K W Lo, N W M Ko.....	267
Flow Past Oscillating Elliptic Cylinder M T Nair, T K Sengupta.....	271
The Reduction in 'Mingling' with Ambient Fluid in a Jet with Off-Source Heating R Narasimha, L Venkatakrishnan.....	275
FEM Analysis of Flow Past a Circular Cylinder Vibrating in the Wake of an Upstream Cylinder B S V Patnaik, P A A Narayana, K N Seetharamu.....	279
Numerical Simulation of Sinusoidal Flow about a Cylinder M S Saidi, M Saghafian.....	283
Numerical Simulation of Plane Mixing Layer of Compressible Flow M D Su, Q B Li, K Xu, M Ghidaoui.....	286
PIV Investigation of a Circular Cylinder in a Sinusoidally Oscillating Cross Flow D K T Thung, C H C Chan, K M Lam, G Q Dai.....	290
Finite Element Analysis for Flow through Periodic Arrays of Aligned Cylinders Y X Wang, H Zhao, X Y Lu, L X Zhuang.....	294
Hysteresis Phenomenon of a V-Grooved Cylinder C H Wong, N W M Ko.....	298
Numerical Simulation of the Initial Stage of Noncondensing High-Speed Gas Jet in Liquid S Q Yi, S Xu, K Yan, J X Chen.....	302

D. FREE SURFACE FLOWS AND WAVES

Discussion on the Effects of Second Order Scattered Wave in Two Layer Ocean H Huang, M G Sun, Z G Luo, J H Wu.....	309
The Propagation of Nonlinear Waves in a Two-Layer Fluid D W C Lai, K H Chan, R W M Leung, K W Chow.....	313
Wave Trapping by Vertical Permeable Barriers near Walls T Sahoo, M M Lee, A T Chwang.....	317
Transient Free Surface Waves due to Impulsive Motion of a Submerged Body J J Shu, A T Chwang.....	321
Coupled Oscillation of an Internal Standing Wave and a Free Shear Layer between Two Parallel Submerged Sluice Gates E B Shuy, H C Chua.....	325
Mass Transport in Thermocline by Wave Maker and Produced Internal Waves M Tsutahara, T Kataoka, M Tsuji.....	329
Higher-Order Internal Wave Theory M Umeyama.....	333
Spring-Seawall as Adaptive Controller on Water Waves T L Yip, A T Chwang.....	337
A Transfer Function Method for Separating 2-D Wave Field S T Zhu, A T Chwang.....	341

E. FLOW ACOUSTICS

✓ Numerical Simulation of the Sound from Vortex-Shock Interaction D X Fu, Y W Ma.....	347
An Experimental Study on Noise Produced by Pulsating Jet A Kimura, J Iwamoto.....	351
On Identifying Aerodynamic Sound Sources — Difficulties in Acoustic Intensity Measurements in Near Fields F Sakao.....	355

F. AEROSPACE FLUID DYNAMICS

Propagation of a Curved Two-Dimensional Weak Shock M Anand, P Prasad.....	361
Research Development on Static Aeroelastic Effects Z L Chen.....	365
Numerical Simulation of Flow Past a Three-Dimensional Flame Deflector K N Dileep, T Jayachandran.....	369
Investigation of High Lift Aerodynamic Configuration of WIG Vehicle G W Han, E J Cui, X T Yu.....	373

Aerodynamic Characteristics of Stationary Savonius and S-Shaped Rotors A K M S Islam, M Q Islam.....	377
The Effect of Downstream Suction on the Delta Wing Leading-Edge Vortex Z Ji, J Marchetta, J Hochstein, J D Mo, K X He, A Chow.....	382
A Panel Method for Aircraft Configurations Oscillating at High Frequencies in Subsonic Flow M K Laha, J Mohan.....	388
Research on the Motion of Shock Wave over Bodies in a Channel Bend J L Le, H L Ni, H L Wang.....	392
Tomographic Measurements of Total Pressure Gradient for Understanding of 3-D Separation Flow Z Q Liu, E J Cui, F Chometon, B Leveque.....	396
The Improvement of the Variational Method with Application in Aerodynamic Optimal Design A Nastase.....	400
Research on Spherical Blast Wave/Body Interaction H L Ni, J L Le.....	405
Estimation of Aerodynamic Characteristics of Helicopter External Stores Support System R Reddy, B Anderson.....	409
Lift Generation and Limiting Mechanism via Unsteady Flow Development for Magnus-Robins Effect T K Sengupta, K Gupta, M T Nair.....	413
The Diffraction of Shock Waves over a Cylinder and a Sphere Using Roe's Scheme E Shirani, H Ahmadikia.....	417
Numerical Study of Three-Dimensional Flow Past an Airfoil at High Incidence T Shu, X Y Lu, G W Yang, L X Zhuang.....	421
Turbulent Near-Wake behind an Infinitely Swept Wing N Subaschandar, A Prabhu.....	425
Numerical Simulation of Rotating Fluids by Lattice Boltzmann Method M Tsutahara, M Okabayashi, T Kataoka.....	429
Computation of Transonic Flow over a Supercritical Wing Y T Wan, G Liu, X D Chen.....	433
Laminar Flow Control of Three-Dimensional Supersonic and Hypersonic Boundary Layer with Wall Cooling G F Zhao.....	437

G. VORTICAL FLOWS

An Exact Solution of Viscous Axisymmetric Vortex Motion M D Deshpande.....	443
Calculation of Three Dimensional Vortex around a Water Intake D Jiao, A Nakayama.....	447
The Dominant Parameters in the Horse-Shoe Vortex A Matsuguchi, S Tsuruno, N Tsuda.....	451

Interaction of Anti-Phase Perturbed Vortex Rings at Medium Wavenumbers C C K Tang, C K Yau, W L Poon, N W M Ko.....	455
--	-----

H. COMPUTATIONAL FLUID DYNAMICS

Solution of Euler Equations over Complex Geometries Using Cartesian Meshes M Boroomand, A Nejat.....	461
The Comparison of the Energy Conservation Errors of the Two Kind of the Finite Element Methods X Cao, C Q Jin.....	465
Large-Eddy Simulation Using Time-Split Finite Elements T Chen, A T Chwang.....	470
Numerical Simulation of Aerodynamic Characteristics for a Wing with an Aileron X D Chen, Y L Zhang, Y T Wang, Z B Chen.....	474
The Numerical Simulation of the Stress-Induced Secondary Flows by HFAM W X Chen, S Z Xie, W Li.....	478
Prediction Method and Topographical Visualization for Skin Friction on Body Surface in Complex Flows Z Y Duan, B G Tong, W J Zhou, G Q Jiang.....	483
Computations of Viscous Compressible Flow in Double-Throat and Plug Nozzles V Esfahanian, A Azimi.....	487
Applications of Computational Fluid Dynamics to Chemical Laser Design W H Hua, Z F Jiang, J B Chen, W Y Li, Y J Zhao.....	491
A New Discrete Vortex Method for Compressible Flow J N Ju, W Q Wu.....	494
Verification and Validation of Upwind Euler Solvers for Aerodynamic Design and Analysis of 3D Configurations P S Kulkarni, S M Deshpande.....	498
On the Lateral Boundary and Grid Resolution Effects on the Computed Separation Angle of a Circular Cylinder C Lei, L Cheng, K Kavanagh.....	502
Variational Formulation of 3-D Unsteady Transonic Rotational Flow in Rotors via a Pseudo-Potential Model G L Liu.....	507
Primary and Secondary Grid Method for 2D-Unsteady Fluid Flows B D Liu, T B Pang.....	511
Effects of Multiple-Grid and Directional Subdividing on Adaptive Grid-Embedding M A Mahabadi, E Shirani.....	515
Simulation of Internal Ballistics of Solid Rocket Motor on a Moving Unstructured Grid K Mazaheri, H H Hoseini.....	519
Three Dimensional Solution Adaptive Approach for Inviscid Compressible Flows K Mazaheri, R K Rahmani, A Ayasoufi.....	524

Computation of Viscous Incompressible Flow on Moving Body-Fixed Coordinate Systems Using Second Order Projection Methods H Pan, M Damodaran.....	528
A New Least Squares Based Finite Difference Scheme for Compressible Flows C Praveen, N Balakrishnan.....	533
Numerical Study of Bore Wave Overtopping Obstruction D C Wan.....	537
Adaptive Grid Method in the Numerical Simulation of Detonation R L Wang, H Q Fu.....	541
Multi-Grid Technique for Turbulent Separated Flow M Yaghoubi, A M Hedesh.....	545
Numerical Study of the Real-Gas Effect in Single-Bubble Sonoluminescence L Yuan, C Y Ho, W Wei, M C Chu, P T Leung.....	549
Calculations for Blast Wave of Spherical TNT Charge with Shock Fitting Technique F J Zhou, K J Shao, Z Y Wang.....	553
 I. FLOW CONTROL	
Passive Control of Shear Layer Turbulence in a Plane Jet P Henry, J F Olsen, S Rajagopalan.....	559
Reactive Control of Unsteady Separation O Mochizuki, M Kiya, S Kumano.....	563
Prediction of Channel Flow with Suction and Blowing J A Naser.....	567
Dynamic Stall Suppression on an Oscillating Airfoil by Steady and Unsteady Tangential Blowing M Sun, S R Sheikh.	570
 J. MULTIPHASE FLOWS AND NON-NEWTONIAN FLOWS	
A Fully Coupled Finite Element Numerical Model for Oil-Gas Biphasic Flow in a Deforming Reservoir P C Dong, S L He, Z X Lang, X H Xu.....	577
Computational Spectral Approach to Unsteady Rotating Flow of Non-Newtonian Fluid S F Han.....	582
Modeling of Two-Phase Flows Using Discrete Element - Finite Element Method Y H Wu, G Q Zhang.....	587
A Scaling Law for Wall Shear Rate through an Arterial Stenosis under the Physiological Conditions S C M Yu, J C Li, L P Chua.....	591
Discrete Vortex Simulation of Two-Phase Plane Mixing Layer H Q Zhang, H Y Wang, X L Wang, C K Chan.....	596
Disturbance Property of Particles Lying on Interface of Moving Two-Phase Jet Z X Zhou, J Z Lin, C X Wang, X Shi, Z J You.....	601

K. CONVECTIVE FLOWS

Natural Convection Heat Transfer from Hot Vee Corrugated Plates to a Cold Flat Plate M A R Akhanda, L Begum.....	607
Numerical Study of Convection Using the Finite Volume Method on Unstructured Meshes H Q Hou, F S Wei, X Z Jin.....	611
Turbulent Natural Convection in a Two-Dimensional Horizontal Annulus M Rahnama, M Farhadi, S H Mansouri, M Yaghoubi.....	616
Laminar Free, Forced and Combined Convection in a Channel with an Isolated Protrusion P A Sarma, B V S S S Prasad.....	620
Onset of Convection with Non-Uniform Temperature Gradient due to Combined Effect of Throughflow and Internal Heat Generation I S Shivakumara, S P Suma.....	625
Numerical Study of Natural Convection in an Annulus between Circular Inner Cylinder and Square Outer Cylinder by GDQ Method C Shu, Y D Zhu.....	629
Rayleigh-Benard Convection in a Second Order Ferromagnetic Fluid with Second Sound P G Siddheshwar.....	633
Existence and Uniqueness of Solution of a Nonlinear Free Convection Problem K Sundaravadivelu, P Kandaswamy.....	637
Free Convection in an Annulus of Rotating Concentric Cylinders M Venkatachalappa.....	641

L. INTERNAL FLOWS

Effect of Mainflow Inlet Width on Penetration and Mixing of Hydrogen in Scramjet Combustor M Ali, A K M S Islam.....	647
Effect of Incidence Angle on Endwall and Tip Clearance Flows in a Two-Dimensional Turbine Rotor Cascade M Govardhan, B H L Gowda, R M Wankhade.....	651

M. COMBUSTION AND REACTING FLOWS

Control of Combustion Oscillations in a Sudden Expansion Flow S R N De Zilwa, J H Whitelaw, S Sivasegaram.....	657
Numerical Simulation of Dual Mode in Combustion Chamber J L Le, L Liu.....	661
Condensed Burning Simulation in a Tube with Heated Wall Using Splitting and Pade Approximations A A Markov.....	665
On the Taylor-Aris Dispersion in a Tube with Phase Exchange and Reaction C O Ng.....	669

Second-Order Approximate Solution of Spray of Fuel in a Cold Environment Using Singular Perturbation Techniques A B Rahimi.....	673
N. INDUSTRIAL FLOWS	
Analysis of the Virtual Impactor Stage of a Monodisperse Aerosol Generator Md S Akhter, S Bhattacharyya, S Chandra, R C Arora.....	679
On Solvent Efficiency in Continuous-Contact Gas Absorber M C Amiri.....	684
Flow Analysis, Heat and Mass Transfer in a Room A R Azimian.....	687
A Critical Review on Pulsatile Pipe Flows M Ö Çapmhoğlu, M Y Gündoğdu.....	691
Mathematical Model of Annular Flow Boiling Heat Transfer in Upward Vertical Tube L Cheng, T Chen.....	699
Nonlinear Theory of Tear Film Rupture M S R Gorla, R S R Gorla.....	703
Numerical Simulation of Flow and Heat Transfer with Solidification in Round Billet Continuous Casting of Steel J H Guo, K Deng, W Wang, T Gong.....	707
Convected Derivative Approach to Constitutive Equation of Liquid Crystalline Polymer and Fluid Flow Bifurcation S F Han.....	711
Thermocapillary Flow in a Painted Moving Fiber W R Hu, N Imaishi.....	716
Drawdown from a Two Layer Fluid Body through a Capped Round Hole M Q Islam, S Bachhar, A K M S Islam.....	720
An Experimental Investigation of Wind Load on Axisymmetrical Shell Structure Houses G Md Khalil.....	724
Some Studies of the Governing Parameters in the Plasma Spraying Process K H Koay, C M Simon, H W Ng, L P Chua.....	728
A Study on the Atomization Characteristics of a Multi-Hole Diesel Nozzle J K Lee, S G Lee, W I Cho, B J Rho.....	733
Length Scaling for Weak Axisymmetric Fountains W X Lin, S W Armfield.....	737
Recognitions of Non-Darcy Flow Characteristics in Low-Permeability Hydrocarbon Reservoirs Y F Liu, Q X He, L R Liu.....	741
Numerical Simulation of Gas Flow in Microchannels X Y Lu, L X Zhuang.....	747
Transient Characteristics of Condensate System of a Power Plant S X Ma, X Li, Q F Yan.....	751

Frequency Characteristics of a Self-Excited Precessing Jet Nozzle J Mi, G J Nathan, S J Hill.....	755
On Wind Tunnel Simulation of Flow around a Running Vehicle: Does suction floor really work? Y Ouwa, F Sakao.....	759
Magnetic Water Treatment for Scale Prevention A Pristovnik, L Lipus, L Crepinsek, J Krope.....	763
Alternative Solution for Multidimensional Drying Problems J W Ribeiro, J B F Duarte.....	767
Transient Behavior of Pressure Driven Cross-Flow of Suspensions K Shams.....	771
A Three-Dimensional Flow Suggested by Meniscus Roll Coating P N Shankar.....	775
A Modified Deconvolution Procedure and Its Application to Spray from an Airblast Atomizer S N Sridhara, B N Raghunandan.....	779
A Study on Pulsating Flow through the Orifice E Tamura, J Iwamoto.....	783
Numerical Analysis for Recovering High-Solidification Point Petroleum Z H Tang, P F Siew, Y H Wu.....	787
Stochastic Model of Ball-Bearing Wear G Sh Tsitsiashvili.....	790
Transition Zone in a Constant Pressure Converging Flow K P Vasudevan, J Dey, A Prabhu.....	792
Modeling of Fluid Flow with Turbulence in the Continuous Casting Process B Wiwatanapataphee, Y H Wu, P F Siew.....	795
The Computer Simulation and Control of Salt Cavity Development in Solution Mining J L Yang.....	799
Numerical Simulation of Sweating Procedure J W Zhang, Z Zhang.....	802
Numerical Study on New Net-Boom Structures Z Zhang, R M Barron, C F An.....	806
Performance of Rotating Heat Pipes with Any Distribution of Heat in the Evaporator R F de Miranda.....	810
 O. ENVIRONMENTAL FLOWS	
Mass-Consistent Wind Model for Sri Lanka during the South-West Monsoon A Gunaratne, L Zubair.....	817
An Urban Drainage Project and Its Environmental Effect X J Hua, Y L Lu.....	821
The Effect of Brownian Motion on Sedimentation of Hard Particles at Large Péclet Number X C Liu, C S Wen.....	825