

Contents

Preface	vii
Welcome address	viii
Committees and scientific societies	x
Foundations and companies	xi
Movie sessions	xii
Contents	xiii

1. General lectures

<i>H. Hasimoto</i>	
Elementary aspects of vortex motion	1
<i>P.G. Saffman</i>	
The stability of vortex arrays to two- and three-dimensional disturbances	13
<i>H.K. Moffatt</i>	
Generalised vortex rings with and without swirl	22
<i>J.J. Keller, W. Egli and R. Althaus</i>	
Vortex breakdown as a fundamental element of vortex dynamics	31
<i>E.-A. Müller and F. Obermeier</i>	
Vortex sound	43
<i>T. Maxworthy</i>	
Waves on vortex cores	52
<i>H. Aref, J.B. Kadtko, I. Zawadzki, L.J. Campbell and B. Eckhardt</i>	
Point vortex dynamics: recent results and open problems	63

2. Two dimensional vortices

<i>R.E. Caflisch</i>	
Nonlinear analysis for the evolution of vortex sheets	75
<i>D.G. Dritschel</i>	
The repeated filamentation of vorticity interfaces	78
<i>Y. Giga and T. Kambe</i>	
Large time behavior of the vorticity of 2D viscous flow and vortex formation in 3D flow	83
<i>P. Capéran and J. Verron</i>	
Numerical simulation of a physical experiment on two-dimensional vortex merging	87
<i>R. Krasny</i>	
Numerical simulation of vortex sheet evolution	93
<i>Y. Kimura</i>	
Chaos and collapse of a system of point vortices	98
<i>H. Yamada, H. Yamabe, A. Itoh and H. Hayashi</i>	
Numerical analysis of a flowfield produced by a pair of rectilinear vortices approaching a circular cylinder	105

<i>J.M.R. Graham and P.D. Cozens</i> Vortex shedding from edges including viscous effects	111
<i>M. Okude and T. Matsui</i> Process of formation of a vortex street in the wake behind a flat plate	115
<i>W.K. Soh, K. Hourigan and M.C. Thompson</i> The shedding of vorticity from a smooth surface	122

3. Ring and three dimensional vortices

<i>C.W. van Atta, M. Gharib and M. Hammache</i> Three-dimensional structure of ordered and chaotic vortex streets behind circular cylinders at low Reynolds numbers	127
<i>Y. Oshima, N. Izutsu, K. Oshima and A.K.M.F. Hussain</i> Bifurcation of an elliptic vortex ring	133
<i>E. Meiburg, J.C. Lasheras and Wm.T. Ashurst</i> Topology of the vorticity field in three-dimensional shear layers and wakes	140
<i>F.R. Hama</i> Genesis of the LIA	149
<i>A. Sym</i> Vortex filament motion in terms of Jacobi theta functions	151
<i>Y. Fukumoto and T. Miyazaki</i> Three-dimensional distortions of a vortex filament: exact solutions of the localized induction equation	157
<i>S. Kuwabara</i> Pseudo-canonical formulation of 3-dimensional vortex motion and vorton model analysis	163
<i>J.J.W. van der Vegt</i> Fundamentals of three-dimensional vortex motion around solid bodies	179
<i>U. Dallmann</i> Three-dimensional vortex structures and vorticity topology	183
<i>A. Braathen and O.M. Faltinsen</i> Interaction between shed vorticity, free surface waves and forced roll motion of a two-dimensional floating body	190
<i>M. Kiya and H. Ishii</i> Vortex dynamics simulation of interacting vortex rings and filaments	197
<i>J.Z. Wu, J.M. Wu and C.J. Wu</i> A viscous compressible flow theory on the interaction between moving bodies and flow field in the (ω, ϑ) framework	203
<i>D. Auerbach</i> Some open questions on the flow of circular vortex rings	209
<i>P.W. Bearman and M. Takamoto</i> Vortex shedding behind rings and discs	214
<i>S. Shingubara, K. Hagiwara, R. Fukushima and T. Kawakubo</i> Transition process from one celled vortex to two celled vortex	219
<i>V.J. Modi, F. Mokhtarian, T. Yokomizo, G. Ohta and T. Oinuma</i> Bound vortex boundary layer control with application to V/STOL airplanes	225
<i>Q.-d. Wei, R.-s. Lin and Z.-j. Liu</i> Vortex-induced dynamic loads on a non-spinning volleyball	231

4. Reconnection of vortices

<i>M.I. Aksman and E.A. Novikov</i>	
Reconnections of vortex filaments	239
<i>M.V. Melander and N.J. Zabusky</i>	
Interaction and "apparent" reconnection of 3D vortex tubes via direct numerical simulations	247
<i>R. Takaki and A.K.M.F. Hussain</i>	
Singular interaction of vortex filaments	251
<i>S. Kida and M. Takaoka</i>	
Reconnection of vortex tubes	257

5. Vortex breakdown

<i>E. Krause</i>	
Numerical prediction of vortex breakdown	263
<i>A. Schmücker and K. Gersten</i>	
Vortex breakdown and its control on delta wings	268

6. Stability and turbulence

<i>T. Tatsumi</i>	
Dynamics of large-scale eddies in turbulent flows	273
<i>M. Farge</i>	
Vortex motion in a rotating barotropic fluid layer	282
<i>E. Kit, A. Tsinober, M. Teitel, J.L. Balint, J.M. Wallace and E. Levich</i>	
Vorticity measurements in turbulent grid flows	289
<i>U. Frisch, H. Scholl, Z.S. She and P.L. Sulem</i>	
A new large-scale instability in three-dimensional incompressible flows lacking parity-invariance	295
<i>M. Mory</i>	
Coherent vortices in a turbulent and rotating fluid	299
<i>M. Ohji and K. Amagai</i>	
Structure of modulated wavy vortical flows in the circular Couette system	305
<i>J.P. Chollet, M. Lesieur and P. Comte</i>	
Numerical simulations of vortices in mixing layers and plane jets	315
<i>R.A. Pasmarter</i>	
Anomalous diffusion and anomalous stretching in vortical flows	320
<i>T. Nakano</i>	
Vorticity field in a cascade model of turbulence	327
<i>C.H. Gibson</i>	
Isoenstrophy points and surfaces in turbulent flow and mixing	331

7. Vortex and sound

<i>K. Shariff, A. Leonard, N.J. Zabusky and J.H. Ferziger</i>	
Acoustics and dynamics of coaxial interacting vortex rings	337

<i>G.E.A. Meier, H.-M. Lent and K.F. Löhr</i>	
Sound generation and flow interaction of vortices with an airfoil and a flat plate in transonic flow	344
<i>M.C. Thompson, K. Hourigan, M.C. Welsh and W.K. Soh</i>	
Prediction of vortex shedding from bluff bodies in the presence of a sound field	349
<i>M. Mathias, A.N. Stokes, K. Hourigan and M.C. Welsh</i>	
Low-level flow-induced acoustic resonances in ducts	353
<i>T. Minota, T. Kambe and T. Murakami</i>	
Acoustic emission from interaction of a vortex ring with a sphere	357
<i>O. Mochizuki, M. Kiya and M. Tazumi</i>	
Vortex – body interaction in a jet – circular cylinder sound generating system	363
<i>M. Kawahashi, E. Brocher and P. Collini</i>	
Coupling of vortex shedding with a cavity	369
8. High speed flow	
<i>D.W. Moore and D.I. Pullin</i>	
The vortex pair in a compressible ideal gas	377
<i>H. Hornung and A. Elsenaar</i>	
Detailed measurements in the transonic vortical flow over a delta wing	381
<i>A. Nastase</i>	
Some considerations on leading edge vortices on wings in supersonic flow	387
<i>J.W. Chalmers, S.W. Hodson, K.-H.A. Winkler, P.R. Woodward and N.J. Zabusky</i>	
Schock-bubble interactions: generation and evolution of vorticity in two-dimensional supersonic flows	392
9. Stratified and rotating fluids	
<i>R. Kimura</i>	
Cell formation in the convective mixed layer	395
<i>M. Takematsu and T. Kita</i>	
The behavior of isolated free eddies in a rotating fluid: Laboratory experiment	400
<i>H. Niino</i>	
Inertial instability of the Stewartson $E^{1/4}$ -layer	407
<i>K. Noto, M. Honda and R. Matsumoto</i>	
Coherent motion of turbulent thermal plume in stably stratified fluid	415
<i>L.M. Polváni, N.J. Zabusky and G.R. Flierl</i>	
Applications of contour dynamics to two layer quasigeostrophic flows	422
<i>H. Honji</i>	
Vortex motions in stratified wake flows	425
List of participants	431
Photos	434
Author index	437