### 数理解析研究所講究録888

157 17 6

# Mathematical Fluid Mechanics and Modeling

# 京都大学数理解析研究所

1994年10月

## Mathematical Fluid Mechanics and Modeling

#### October 17, 1994

This lecture note collects 18 papers presented at the RIMS workshop " Mathematical Fluid Mechanics and Modeling", which was held at Research Institute for Mathematical Sciences, Kyoto University during May 30 – June 2, 1994. The workshop was originally planned by H. O. in order to make Professor Alexandre J. Chorin's visit to Kyoto be well publicized and to let his theory be available to as many scientists as possible. Then the first plan was enlarged by participation of some physicists who wish to listen to Professor Chorin's lectures. As a result, we made the workshop one of the annual series of workshops on fluid physics.

Professor Chorin's visit was supported by the Japan Society for Promotion of Science, without whose support this workshop were impossible. On behalf of all the workshop participants, we express our sincere thanks to JSPS.



T. Kambe Dept. of Physics University of Tokyo H. Okamoto RIMS Kyoto University

### Contents

A.J. Chorin, On turbulence modeling 1
K. Fujimura and R.E. Kelly, Degenerate bifurcation in stably stratified plane Poiseuille flow
Y. Fukumoto, Steady configurations of a vortex filament in background flows
Y. Hattori, Differential-geometric formulation of the ideal MHD 37
S. Kida and M. Tanaka, Dynamics of vortical structure in a homogeneous shear flow
T. Ishihara and Y. Kaneda , Spontaneous singularity formation in the shape of vortex sheet in three-dimensional flow – analysis and nu- merical simulation
K. Ishii and S. Adachi, 渦輪の衝突から発生する渦音の数値シミュレー ション 73
T. Makino, K. Mizohata and S. Ukai, Recent topics on the compressible Euler equation
T. Miyazaki and Y. Fukumoto, Three-dimensional instability of Kirchhoff's elliptic vortex – Its relation to the elliptical instability
J. Mizushima, 流れの中の形の形成 – ベナール対流 112
T. Nakaki, On some numerical computations to the oil-reservoir problems 120
H. Okamoto, Nearly singular two-dimensional Kolmogorov flows for large Reynolds numbers
Y. Sone, K. Aoki, H. Sugimoto and H. Motohashi, The Bénard problem of rarefied gas dynamics
R. Takaki and N. Tokugawa, Modeling of superheated drop vibration 158

Y. Teramoto case	, Navier-Stokes flow down a vertical column: an axisymmetric	2
S. Ukai, O	n the singular limits of the Boltzmann equation	'9
M. Umeki,	Bifurcation structures of two-dimensional Poiseuille flow 19	3
H. Fujita, fluid	A mathematical analysis of motions of viscous incompressible under leak or slip boundary conditions	19

The manuscripts of the following two lectures were not available before the deadline.

T. Kambe (University of Tokyo), Geometrical study of Eulerian fluid motion and KdV system: geodesic equations and and curvatures

K. Ohkitani ( Hiroshima University ) Vorticity-strain conjugation in incompressible fluid flows