

## Background and Topics of the Symposium

At present, three national research institutes are carrying out a study on Smart Control of Turbulence ("Smart Control of Turbulence: A Millennium Challenge for Innovative Thermal and Fluids Systems", Project for Organized Research Combination System by the Ministry of Education, Culture, Sports, Science and Technology, Executive Manager: Hideo Ohashi, President, Kogakuin University, Steering Committee Chair: Nobuhide Kasagi, Professor, The University of Tokyo). The purpose of this study is to realize the smart turbulence control, which should lead to tremendous technological impacts such as drag reduction and enhancement in combustion and heat transfer, by developing highly intelligent fluid-dynamic devices with new functions. This interdisciplinary research target can be fulfilled by the unique collaboration between three national laboratories, namely, NAL (National Aerospace Laboratory, Ministry of Education, Culture, Sports, Science and Technology), MEL (Mechanical Engineering Laboratory, National Institute of Advanced Industrial Science and Technology, Ministry of Economy, Trade and Industry), and SRI (Ship Research Institute, Ministry of Land, Infrastructure and Transport). Leading scientists at several top universities will also join and help with this project.

In this Symposium, invited speakers will give overviews on the recent study of smart control of turbulence and the speakers of the each research institutes will present following research targets: (1) conceptual design of micro devices for active feedback control of turbulence, (2) study on control of turbulent combustion, (3) turbulence control with mechano-chemical functionalization of fluids (surfactants, micro bubbles, ... etc.), and (4) large-scale numerical simulation of shear flow turbulence, turbulence combustion, and turbulence control mechanisms.

## Organizing Committee

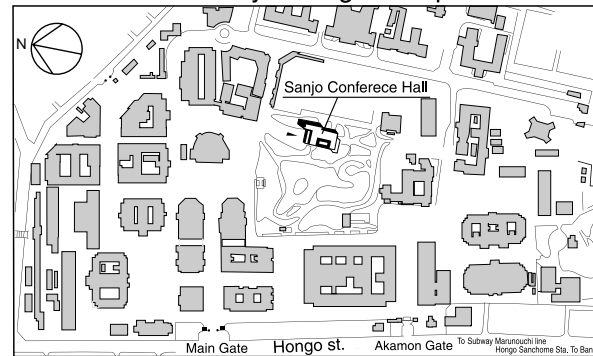
Prof. Nobuhide Kasagi (Chair, The University of Tokyo)  
 Dr. Satoru Ogawa (NAL)  
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 Dr. Hiro Yoshida (MEL)  
 Dr. Yasuo Kawaguchi (MEL)  
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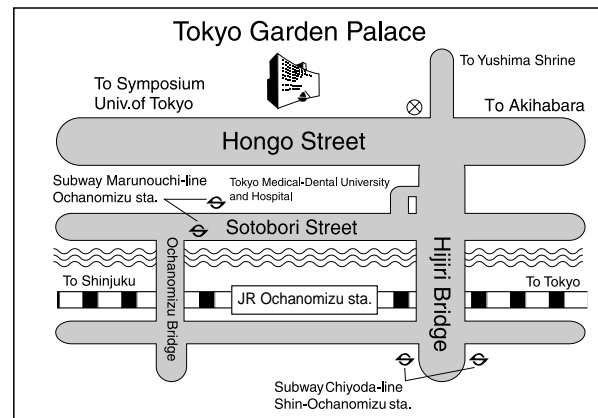
## [Symposium Site]

### Univ. of Tokyo Hongo Campus



## [Banquet]

Date : March 5th 18:30 - 20:30  
 Place : Tokyo Garden Palace Hotel, room "Nishiki"  
 Fee : ¥3,000( Student, ¥1,000 )



## Secretariat of

2nd Symposium on Smart Control of Turbulence  
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# 2nd Symposium on Smart Control of Turbulence

Sanjo Conference Hall  
 The University of Tokyo  
 Tokyo, Japan

March 4-6, 2001

## Sponsored by

National Aerospace Laboratory  
 Mechanical Engineering Laboratory  
 Ship Research Institute

## Supported by

Ministry of Education, Culture, Sports,  
 Science and Technology  
 Graduate School of Engineering,  
 The University of Tokyo

## in cooperation with

The Japan Society of Mechanical Engineers  
 The Japan Society for Aeronautics and  
 Space Sciences  
 The Society of Naval Architects of Japan

World Wide Web:

<http://www.srinot.go.jp/turbulence/english/symposium/FY2000/>

# Time Table

March 4( Sun )

17:30-19:30 Registration & Reception Party

March 5( Mon )

09:30-09:50 Opening and Welcome Address  
S. Ohgaki, Univ. of Tokyo  
H. Ohashi, Kogakuin Univ.

09:50-10:20 Overview of Turbulence Control Project  
N. Kasagi, Univ. of Tokyo  
Y. Kawaguchi, MEL  
K. Suzuki, NAL

10:20-12:20 Technical Session 1  
( Active Control of Turbulence )

10:20-11:05 Controlling A Linear Process in  
Nonlinear Flows  
John Kim, invited speaker, UCLA

11:05-11:30 R&D Study on Micro Sensors and  
Actuators for Active Control of Wall  
Turbulence  
Y. Suzuki, N. Kasagi et al., Univ. of Tokyo

11:30-11:55 Turbulence Control in  
Low-to-Moderate Reynolds Number  
Flows  
T. Endo, RIKEN and N. Kasagi,  
Univ. of Tokyo

11:55-12:20 Control of Streak Structures in Wall  
Turbulence Using a Piezo-Ceramic  
Actuator Array  
T. Segawa, Y. Kawaguchi et al., MEL

[Lunch]

13:30-15:30 Technical Session 2  
( Turbulence Control by Using of  
Functionality of Fluid Property )

13:30-14:15 Some Recent Developments in Surfactant  
Drag Reduction  
Jacques L. Zakin, invited speaker  
and Yunying Qi,  
The Ohio State University

14:15-14:40 Turbulent Spatial Structure in a  
Drag-Reducing Flow with Surfactant  
Additives Investigated by PIV System  
Y. Kawaguchi and Z. Feng, MEL

14:40-15:05 Measurements of Turbulent  
Micro-Structure in Bubbly Flows Using  
Combined PIV/LIF/IST Technique  
K. Hishida, A. Fujiwara, Keio Univ. et al.

15:05-15:30 Mechanisms and Scale Effects of Skin  
Friction Reduction by Microbubbles  
T. Takahashi, A. Kakugawa et al., SRI

[Break]

15:50-17:50 Technical Session 3  
( Control of Turbulent Combustion )

15:50-16:35 Active Control of Combustion Instabilities  
Ben T. Zinn, invited speaker  
Georgia Institute of Technology

16:35-17:00 Characteristics of Hydrogen Combustion in  
an Experimental Lean Premixed  
Combustor  
T. Kishi, K. Hiraoka et al., SRI

17:00-17:25 Structure of Swirler Flame in Gas Turbine  
Combustor  
T. Yamamoto, K. Suzuki et al., NAL

17:25-17:50 Mixing Enhancement of Coaxial Jet with  
Arrayed Flap Actuators for Active  
Control of Combustion Field  
N. Kurimoto, Y. Suzuki et al., Univ. of Tokyo

18:30-20:30 Banquet at Tokyo Garden Palace Hotel

March 6( Tue )

09:30-11:05 Technical Session 4  
( Active Control of Turbulence )

09:30-10:15 Electrokinetic Microactuator Arrays for  
Sublayer Control in Turbulent Boundary  
Layers  
Werner J.A. Dahm, invited speaker, and  
Francisco J. Diez-Garias, The University of  
Michigan

10:15-10:40 Vortex Generator Composed of Micro Jet  
Array for Flow Separation Control  
H. Abe, T. Segawa et al., MEL

10:40-11:05 Observation and Control of Separation  
from Bluff Bodies  
S. Takagi et al., NAL, H. Yoshida et al., MEL

[Break]

11:15-12:30 Technical Session 5  
( Turbulence Control by Using of  
Functionality of Fluid Properties )

11:15-11:30 Overview of Multi-Scale Analysis of  
Multi-Phase Flow  
Y. Matsumoto, Univ. of Tokyo

11:30-11:50 Evolution of Subgrid Scale by Particles in a  
Turbulent Channel Flow  
Y. Sato, MEL and K. Hishida, Keio Univ.

11:50-12:10 Direct Numerical Simulation of Wall  
Turbulence with Bubbles  
T. Kawamura, Y. Kodama, SRI

12:10-12:30 Multiscale Modeling of Rising Packed Bubbles  
K. Sugiyama, IML, Univ. of Tokyo,  
S. Takagi et al., Univ. of Tokyo

[Lunch]

13:50-15:30 Technical Session 6  
( Control of Turbulent Combustion )

13:50-14:15 Fast Response Local Equivalence Ratio  
Measurement in Premixed Turbulent Flame  
Y. Ikeda, J. Kojima et al., Kobe Univ.

14:15-14:40 Study on Control Factors and System for  
Turbulent Combustion Control  
K. Hayashi, Aoyamagakuin Univ., et al.

14:40-15:05 Mechanism and Prediction of Sound  
Generation in Reacting Mixing Layers  
T. Miyauchi, M. Tanahashi and Y. Li,  
Tokyo Inst. of Tech.

15:05-15:30 Fundamental Study toward Numerical  
Simulation of Turbulent Combustion Control  
Y. Mizobuchi, R. Takaki et al., NAL

15:30-15:40 Closing Session  
Y. Kodama, SRI