

# **PROGRAM**

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## **Flow Dynamics**

**First International Conference on Flow Dynamics**

## **AFI/TFI-2004**

**Fourth International Symposium on Advanced Fluid Information /  
First International Symposium on Transdisciplinary Fluid Integration**

November 11-12, 2004

Sendai International Center, Sendai, Japan

# **First International Conference on Flow Dynamics**

## **Organized and Sponsored by**

The 21st Century COE program, "International COE of Flow Dynamics," Tohoku University, Japan

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# Fourth International Symposium on Advanced Fluid Information / First International Symposium on Transdisciplinary Fluid Integration

**Hosted by:** Institute of Fluid Science, Tohoku University, Japan

**Sponsored by:**

Tohoku University Foundation

Science Foundation for Fluid Mechanics and Instruments

Inoue Foundation for Science

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## Plenary Lectures

### **TFI Plenary Lecture**

(9:10-10:10, November 11, at “Tachibana”)

**Combined Heat, Air, Moisture, and Pollutants Transport in Building  
Environmental Systems  
Prof. Jianshun Zhang (Syracuse University, U.S.A.)**

### **AFI Plenary Lecture**

(13:00-14:00, November 11, at “Tachibana”)

**Intelligent Systems: Shaping the Future of Aeronautics and Space  
Exploration  
Dr. Kalmanje KrishnaKumar (NASA Ames Research Center, U.S.A.)**

### **COE Plenary Lecture**

(9:00-10:00, November 12, at “Hagi”)

**Dynamic Activity of Water on the Nature Technology  
Dr. Hideki Ishida (INAX Corporation / Tohoku University, Japan)**

## General Sessions

### **First International Conference on Flow Dynamics**

#### **Organized Sessions:**

OS1: Research and Development of Japan Made High Performance Jet Plane

OS2: Nano-Mega Ground Effect and Applications

OS3: Functional Fluids Flow Dynamics in Interactive Systems

OS4: Force Generation through Shock Wave Dynamics

OS5: Alleviation of Shock-Induced Impacts

OS6: Planetary Entry Flow Physics

OS7: Water Dynamics

OS8-A: Young Birds Hatchery Seminar on Flow Dynamics

OS8-B: International Students/Young Birds Session on Flow Dynamics

### **Fourth International Symposium on Advanced Fluid Information / First International Symposium on Transdisciplinary Fluid Integration**

#### **Mini-Symposia:**

MS1: Fluid Informatics in Bio-Fluid Systems

MS2: Fusion of Biotechnology and Nanotechnology

MS3: Advanced Fluid Information and Aerospace Applications

MS4: Collaborative Visualization and Volume Communication

MS5: 5th Japan-Korea Seminar on Combustion and Heat Transfer & CERC Workshop

MS6: Smart Material, Structural and Fluid Systems

MS7: Advanced Fluid Information for Controlling Flows

## **General Information**

### **Registration:**

The conference registration desk is located at **Main Hall, 2nd floor**.

**8:30 – 17:00, Thursday, November 11**

**8:30 – 17:00, Friday, November 12**

### **Banquet:** (at Sakura 1)

**19:00 – 21:00, Thursday, November 11**

### **Exhibition:** (at Sakura 2)

All conference attendees may view the exhibition for free. Exhibition hours will be:

**18:00 – 21:00, Thursday, November 11**

**9:00 – 17:00, Friday, November 12**

### **Internet access corner:** (at Sakura 2)

All conference attendees may use internet for free. Free Ethernet access will be possible at Sakura 2 during the conference. Standard wired hubs (with RJ45 sockets) will be provided for networking.

Internet corner will be opened at:

**15:00 – 21:00, Thursday, November 11**

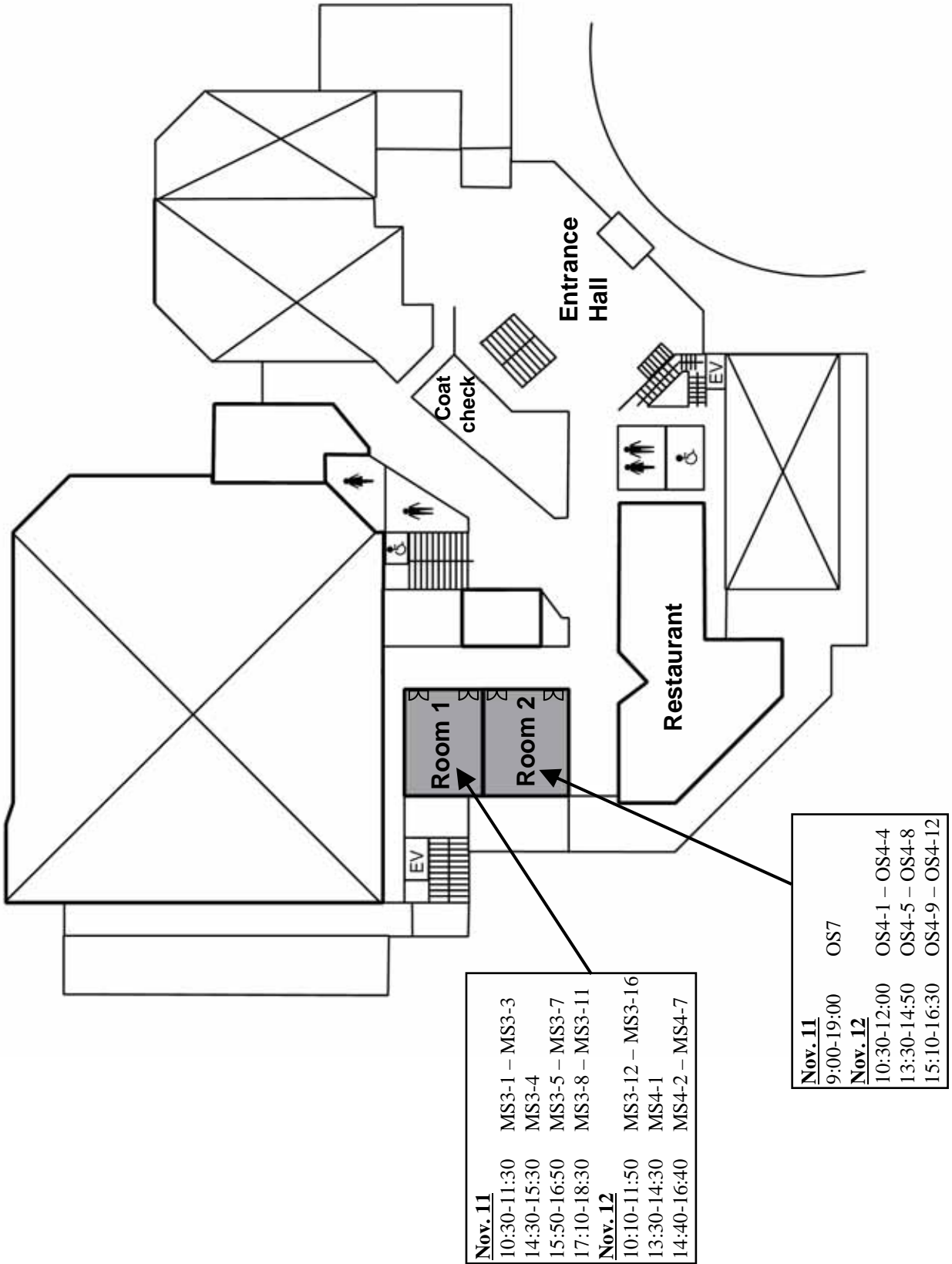
**9:00 – 17:00, Friday, November 12**

### **Coffee service:**

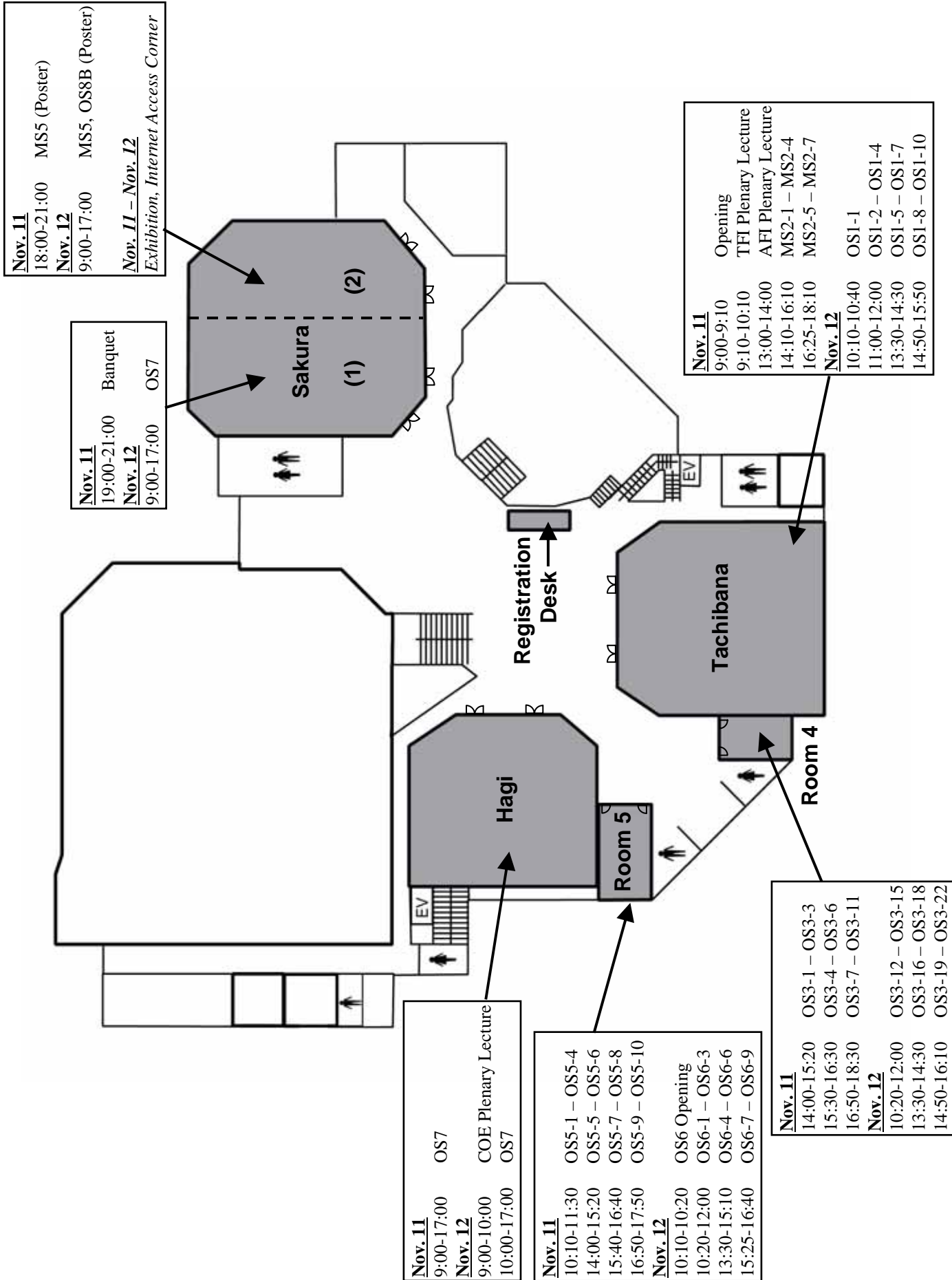
Coffee service is prepared at **3rd floor**, in front of the stairs.

# Floor Plan of Sendai International Center

1st floor (Room 1, Room 2)

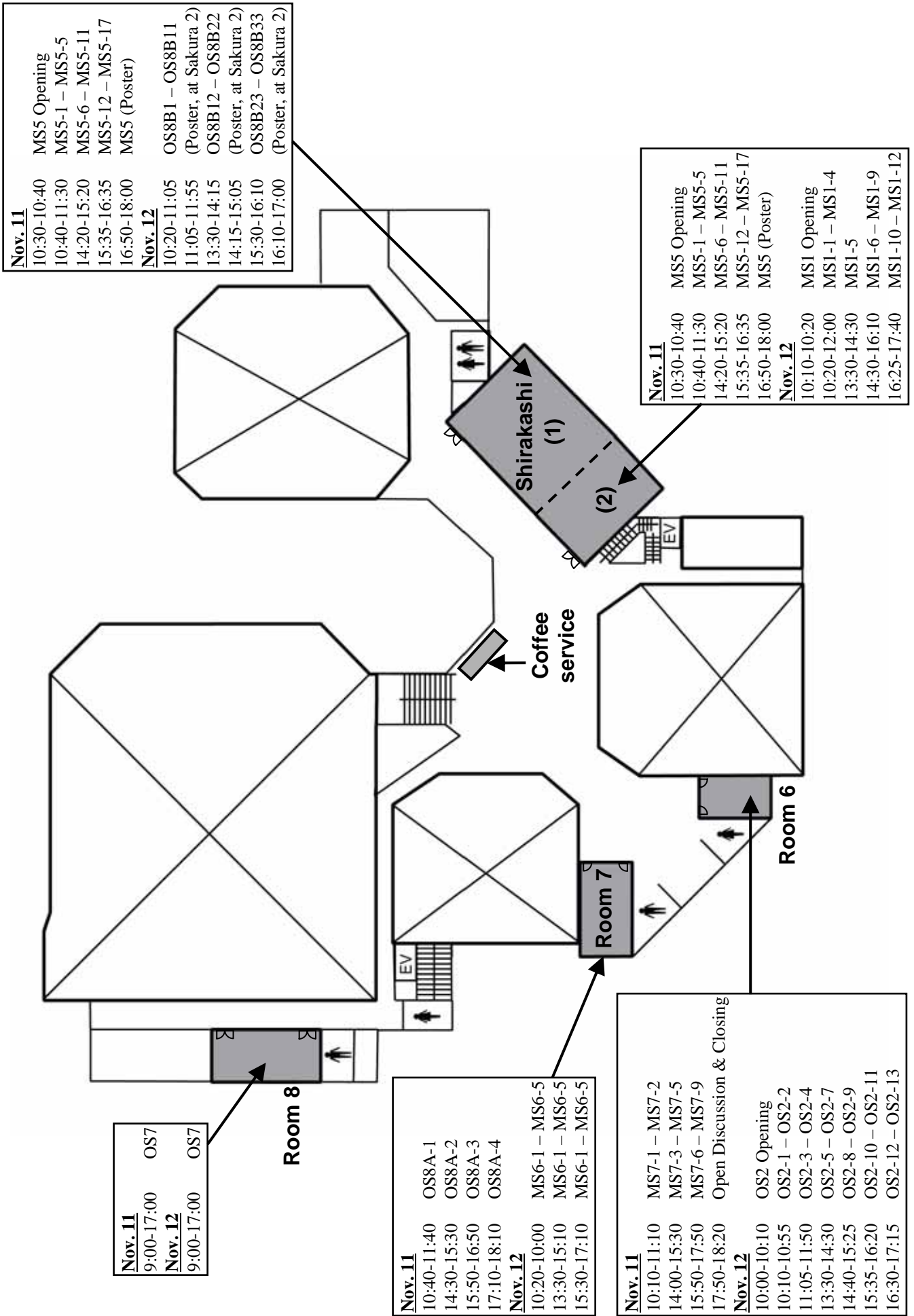


# 2nd floor (Sakura, Tachibana, Hagi, Room 4, Room 5)





### 3rd floor (Shirakashi, Room 6, Room 7, Room 8)



<b>Nov. 11</b>	10:30-10:40	MS5 Opening
	10:40-11:30	MS5-1 – MS5-5
	14:20-15:20	MS5-6 – MS5-11
	15:35-16:35	MS5-12 – MS5-17
	16:50-18:00	MS5 (Poster)
<b>Nov. 12</b>	10:20-11:05	OS8B1 – OS8B11
	11:05-11:55	(Poster, at Sakura 2)
	13:30-14:15	OS8B12 – OS8B22
	14:15-15:05	(Poster, at Sakura 2)
	15:30-16:10	OS8B23 – OS8B33
	16:10-17:00	(Poster, at Sakura 2)

<b>Nov. 11</b>	10:30-10:40	MS5 Opening
	10:40-11:30	MS5-1 – MS5-5
	14:20-15:20	MS5-6 – MS5-11
	15:35-16:35	MS5-12 – MS5-17
	16:50-18:00	MS5 (Poster)
<b>Nov. 12</b>	10:10-10:20	MS1 Opening
	10:20-12:00	MS1-1 – MS1-4
	13:30-14:30	MS1-5
	14:30-16:10	MS1-6 – MS1-9
	16:25-17:40	MS1-10 – MS1-12

<b>Nov. 11</b>	9:00-17:00	OS7
<b>Nov. 12</b>	9:00-17:00	OS7

<b>Nov. 11</b>	10:40-11:40	OS8A-1
	14:30-15:30	OS8A-2
	15:50-16:50	OS8A-3
	17:10-18:10	OS8A-4
<b>Nov. 12</b>	10:20-10:00	MS6-1 – MS6-5
	13:30-15:10	MS6-1 – MS6-5
	15:30-17:10	MS6-1 – MS6-5

<b>Nov. 11</b>	10:10-11:10	MS7-1 – MS7-2
	14:00-15:30	MS7-3 – MS7-5
	15:50-17:50	MS7-6 – MS7-9
	17:50-18:20	Open Discussion & Closing
<b>Nov. 12</b>	10:00-10:10	OS2 Opening
	10:10-10:55	OS2-1 – OS2-2
	11:05-11:50	OS2-3 – OS2-4
	13:30-14:30	OS2-5 – OS2-7
	14:40-15:25	OS2-8 – OS2-9
	15:35-16:20	OS2-10 – OS2-11
	16:30-17:15	OS2-12 – OS2-13

Thursday, November 11, 2004

	Tachibana	Room1	Room4	Room5	Room6	Room7
9:00	9:00 Opening	(9:00-9:10 Opening, at "Tachibana")				
9:10-10:10	TFI Plenary Lecture J.S.Zhang	(9:10-10:10 TFI Plenary Lecture, at "Tachibana")				
10:00				10:20 OS5-1 H.Taniguchi (Invited)	10:10 MS7-1 J.-P.Bonnet (Invited)	
11:00		10:30 MS3-1 W.Yamazaki		10:40 OS5-2 T.Furukawa		10:40 OS8A-1 M.lima (Invited)
		10:50 MS3-2 S.Watanabe		11:00 OS5-3 Y.Miura	11:10 MS7-2	
		11:10 MS3-3 H.-H.Shi		11:20 OS5-4 S.Oshiba	J.Ausseur	
12:00	(Lunch)					
13:00	13:00-14:00 AFI Plenary Lecture K.KrishnaKumar	(13:00-14:00 AFI Plenary Lecture, at "Tachibana")				
14:00			14:00 OS3-1 O.P.Solonenko (Invited)	14:00 OS5-5 M.Yoshida (Invited)	14:00 MS7-3 A.Nishizawa	
14:00	14:10 MS2-1 I.Yamashita					
	14:20 MS2-2 J.E.Johnson (Invited)	14:30 MS3-4 A.J.Meade (Invited)	14:40 OS3-2 M.Tanaka	14:40 OS5-6 E.Zaretsky (Invited)	14:30 MS7-4 K.Fukagata	14:30 OS8A-2 T.Tajikawa (Invited)
15:00	15:00 MS2-3 T.Urisu		15:00 OS3-3 Y.Tanaka		15:00 MS7-5 S.Izawa	
16:00	15:35 MS2-4 T.Ichiki		15:30 OS3-4 M.Shigeta			
		15:50 MS3-5 J.-H.Yoo	15:50 OS3-5 M.Okubo	15:40 OS5-7 J.J.Alonso (Invited)	15:50 MS7-6 T.Hayase	15:50 OS8A-3 K.Yokoi (Invited)
	16:25 MS2-5 T.Aoyagi	16:10 MS3-6 I.-G.Lim	16:10 OS3-6 T.Sato	16:20 OS5-8 Y.Makino	16:20 MS7-7 H.Higuchi	
17:00	17:00 MS2-6 S.Yoshii		16:50 OS3-7 I.Kataoka	16:50 OS5-9/OS1-11 K.Kusunose (Invited)	16:50 MS7-8 H.Sato	
		17:10 MS3-8 Y.Ooba	17:10 OS3-8 M.Shams		17:20 MS7-9 R.E.A.Arndt	17:10 OS8A-4 M.Uchiumi (Invited)
18:00	17:35 MS2-7 S.Samukawa	17:30 MS3-9 T.Ozawa	17:30 OS3-9 D.Sivakumar	17:30 OS5-10 Y.Goto		
		17:50 MS3-10 G.Hashimoto	17:50 OS3-10 X.R.Zhang		17:50 MS7 Open Discussion and Closing	
		18:10 MS3-11 J.Imamura	18:10 OS3-11 H.Takana			
19:00						
20:00	(19:00- Banquet, at "Sakura 1")					
21:00						

Shirakashi 1	Shirakashi 2	Sakura 1	Sakura 2	Hagi	Room2	Room8	
(9:00-9:10 Opening, at "Tachibana")				OS7: Water Dynamics (Refer to separate program)	OS7: Water Dynamics (Refer to separate program)	OS7: Water Dynamics (Refer to separate program)	9:00
(9:10-10:10 TFI Plenary Lecture, at "Tachibana")							10:00
10:30 MS5 Opening							
10:40 MS5-1 H.D.Shin (Invited)							
10:50 MS5-2 H.Y.Kim							
11:00 MS5-3 N.I.Kim							11:00
11:10 MS5-4 C.Y.Lee							
11:20 MS5-5 K.Takita							
(Lunch)							12:00
(13:00-14:00 AFI Plenary Lecture, at "Tachibana")							13:00
							14:00
14:20 MS5-6 S.In							
14:30 MS5-7 W.-H.Park							
14:40 MS5-8 W.Yang							
14:50 MS5-9 H.Kobayashi							
15:00 MS5-10 J.Kim							15:00
15:10 MS5-11 Y.Nunome							
15:35 MS5-12 W.Kang							
15:45 MS5-13 V.K.Baev							
15:55 MS5-14 S.Kadowaki							16:00
16:05 MS5-15 W.Lee							
16:15 MS5-16 T.Hasegawa							
16:25 MS5-17 H.Kobayashi							
16:50 MS5 Poster Presentation							17:00
							18:00
			18:00 MS5 Poster Presentation, Exhibition				
							19:00
(19:00- Banquet, at "Sakura 1")		19:00 Banquet					20:00
							21:00

**Friday, November 12, 2004**

	Tachibana	Room1	Room2	Room4	Room5	Room6
9:00	(9:00-10:00 COE Plenary Lecture, in "Hagi")					
10:00						10:00 OS2 Opening
	10:10 OS1-1 D.-H.Lee (Invited)	10:10 MS3-12 L.Parussini		10:20 OS3-12 J.D.Carlson (Invited)	10:10 OS6 Opening 10:20 OS6-1 C.Park (Invited)	10:10 OS2-1 E.Bertran (Invited)
		10:30 MS3-13 S.Pieri	10:30 OS4-1 N.Chinzei (Invited)			10:40 OS2-2 T.Takeno
11:00		10:50 MS3-14 H.-J.Kim				
	11:00 OS1-2 K.Kamo	11:10 MS3-15 M.Kanazaki	11:00 OS4-2 T.Kouchi	11:00 OS3-13 H.Yamaguchi	11:10 OS6-2 K.Fujita	11:05 OS2-3 J.Fontaine (Invited)
	11:20 OS1-3 A.Nishizawa	11:30 MS3-16 K.Chiba	11:20 OS4-3 T.Kanda	11:20 OS3-14 M.Ohaba		
	11:40 OS1-4 S.Iwase		11:40 OS4-4 E.Kitamura	11:40 OS3-15 S.Sudo	11:35 OS6-3 Y.Miura	11:35 OS2-4 T.Abe
12:00	(Lunch)					
13:00						
14:00	13:30 OS1-5 S.Tatsumi	13:30 MS4-1 H.-C.Hege (Invited)	13:30 OS4-5 T.Ohtani	13:30 OS3-16 T.Sawada	13:30 OS6-4 G.Candler (Invited)	13:30 OS2-5 Y.Kohama
	13:50 OS1-6 D.-H.Yoon		13:50 OS4-6 Y.Xilong	13:50 OS3-17 K.Shimada		14:00 OS2-6 Y.Takahashi
	14:10 OS1-7 A.Inasawa		14:10 OS4-7 K.Watanabe	14:10 OS3-18 Y.Ido		14:15 OS2-7 T.Ishizuka
			14:30 OS4-8 K.Mori		14:20 OS6-5 K.Komurasaki	
15:00	14:50 OS1-8 Y.Kohama	14:40 MS4-2 N.Kukimoto		14:50 OS3-19 M.Nakano	14:45 OS6-6 T.Aochi	14:40 OS2-8 S.Zhang (Invited)
	15:10 OS1-9 K.Sakurai	15:00 MS4-3 Y.Takeshima	15:10 OS4-9 S.Obata	15:10 OS3-20 T.Tsukiji		15:10 OS2-9 D.Torii
	15:30 OS1-10 K.Nishide	15:20 MS4-4 N.Sakamoto	15:30 OS4-10 H.Nakamura	15:30 OS3-21 T.Narumi	15:25 OS6-7 K.Murakami	
16:00	OS5-9/OS1-11 See OS5 (Room 5, 16:50-17:30, November 11)	15:40 MS4-5 J.Nonaka	15:50 OS4-11 H.Sugiyama	15:50 OS3-22 S.Morishita	15:50 OS6-8 K.Suzuki	15:35 OS2-10 N.Ohtake (Invited)
		16:00 MS4-6 M.Watanabe	16:10 OS4-12 G.Masuya		16:15 OS6-9 T.Abe	16:05 OS2-11 T.Takagi
		16:20 MS4-7 I.Fujishiro			16:40 OS6 Closing	16:30 OS2-12 T.Ohana (Invited)
17:00	X		X			17:00 OS2-13 I.Nakamori
	X		X			17:15 OS2 Closing
18:00						
19:00						





# First International Conference on Flow Dynamics Program

## Hagi

## Plenary Lecture

November 12, 2004

9:00-10:00      **Dynamic Activity of Water on Nature Technology**  
Hideki Ishida (INAX Corporation/ Tohoku University, Japan)

## Tachibana

## OS1 Research and Development of Japan Made High Performance Jet Plane

November 12, 2004

OS1-1      Chair: Yasuaki Kohama (Tohoku University, Japan)  
10:10-10:40      **An Optimal Design of Supersonic Fighter Wing for Multi-Fight Conditions**  
(Invited)  
Dongho Lee (Seoul National University)

10:40-11:00      Break

OS1-2      Chair: Shuya Yoshioka (Tohoku University, Japan)  
11:00-11:20      **Future Small Aircraft and Its Transportation System**  
Keisuke Kamo (Fuji Heavy Industries Ltd., Aerospace, Japan)

OS1-3      **A Concept of Future Airborne System and Aircraft in Japan**  
11:20-11:40      Akira Nishizawa, Shohei Takagi (Japan Aerospace Exploration Agency (JAXA), Japan), Shigeru Aso (Kyushu University, Japan) and Shigeru Obayashi (Tohoku University, Japan)

OS1-4      **Cluster Fan VTOL**  
11:40-12:00      Shiki Iwase, Yoshio Saito and Yukio Matsuda (Japan Aerospace Exploration Agency (JAXA), Japan)

12:00-13:30      Lunch

OS1-5      **Toward the Development of Environmentally Friendly High Performance Small Jet Aircraft**  
13:30-13:50      Shigefumi Tatsumi (Mitsubishi Heavy Industries, Ltd., Japan)

OS1-6      Chair: Shohei Takagi (Japan Aerospace Exploration Agency (JAXA), Japan)  
13:50-14:10      **Improvement of Aerodynamic Performance of Wings on Wing-in-Ground Effect Vehicle**  
Dong-Hee Yoon, Shuya Yoshioka, Satoshi Kikuchi, Takuma Kato and Yasuaki Kohama (Tohoku University, Japan)

- OS1-7                    **Numerical Study of Instabilities in Three-Dimensional Boundary Layers**  
 14:10-14:30        Ayumu Inasawa, Seiichiro Izawa, Ao-Kui Xiong and Yu Fukunishi (Tohoku University, Japan)
- 14:30-14:50        Break
- OS1-8                    **Energy Efficient 1.5 Engine Business Jet Plane Concept**  
 14:50-15:10        Yasuaki Kohama (Tohoku University, Japan)
- OS1-9                    **Let's Create World No.1 Glider!**  
 15:10-15:30        Katsuo Sakurai (Ena Tokai Rika CO.,LTD. , Japan)
- OS1-10                **The Report of Activity of "Team Windnauts Tohoku Univ." and Result of 28th JIBR**  
 15:30-15:50        Kenji Nishide, Yasuaki Kohama (Windnauts, Tohoku University, Japan)
- OS5-9/OS1-11        See OS5 (November 11, 16:50-17:30, Room5)

**Room6**

**OS2 Nano-Mega Ground Effect and Applications**

November 12, 2004

- [DLC (1)]            Chair: Toshiyuki Takagi (Tohoku University, Japan)  
 10:00-10:10        Opening speech  
                           Toshiyuki Takagi (Tohoku University, Japan)
- OS2-1                **New Characteristics of DLC Coatings Produced by Pulsed-DC Glow at Room Discharge Temperature** (Invited)  
 10:10-10:40        Enric Bertran (Barcelona University, Spain)
- OS2-2                **Tribological Properties of Diamond-Like Carbon Films Deposited under Different Vias Voltage**  
 10:40-10:55        Takanori Takeno, Toshihiko Komoriya, Hiroyuki Miki, Toshiyuki Takagi, Takeshi Sato (Tohoku University, Japan), Alexei Bozhko (Moscow State University, Russia) and Mikhail Shupegin (Moscow Power Engineering Institute, Russia)
- 10:55-11:05        Break
- [Tribology(1)]        Chair: Naoto Ohtake (Tokyo Institute of Technology, Japan)  
 OS2-3                **Achieving superlow friction with hydrogenated amorphous carbon : the key-role of transfer phenomena** (Invited)  
 11:05-11:35        Julien Fontaine(Invited speaker), Thierry LE Mogne , Jean Luc Loubet , Michel Belin, (Ecole Centrale de Lyon, France)
- OS2-4                **Very Low Friction Behavior of a Partly Polished CVD Diamond Film Slide on a Metal Plate**  
 11:35-11:50        Toshihiko Abe, Toshiyuki Takagi, Tetsuya Uchimoto and Yasuaki Kohama (Tohoku University, Japan)



- 11:50-13:30 Lunch
- [Ground effect] Chair: Tsuguyori Ohana: (National Institute of Advanced Industrial Science and Technology (AIST), Japan)
- OS2-5 **A Possible New Research Field in Nano-Mega Scale Wing-in-Ground Effect**  
13:30-14:00 Yasuaki Kohama (Tohoku University, Japan)
- OS2-6 **An Analysis of Ground Effects on Aerodynamic Characteristics of Aerofoils with a Secondary Aerofoil using Boundary Layer Approximation**  
14:00-14:15 Yuji Takahashi (Miyakonojo National College of Technology, Japan), Masanori Kikuchi, Kimitaka Hirano (University of Miyazaki, Japan) and Yasuaki Kohama (Tohoku University, Japan)
- OS2-7 **Aerodynamic Characteristics of V-shaped Aero-Train Wing**  
14:15-14:30 Tomoyuki Ishizuka (Tohoku University, Japan)
- 14:30-14:40 Break
- [Tribology(2)] Chair: Enric Bertran (Barcelona University, Spain)
- OS2-8 **Tribological Behaviors of Diamond-Like Carbon and Carbon-Based Protective Coatings in Dry and Fluid-Lubricated Conditions** (Invited)  
14:40-15:10 Sam Zhang (Invited speaker) and Xuan Lam Bui (Nanyang Technological University, Singapore)
- OS2-9 **Molecular Thermal and Fluid Phenomena in a Nanoscale Liquid Lubrication System**  
15:10-15:25 Daichi Torii and Taku Ohara (Tohoku University, Japan)
- 15:25-15:35 Break
- [DLC(2)] Chair: J. Fontaine: (Ecole Centrale de Lyon, France)
- OS2-10 **Preparation and Characteristics of Diamond-like Carbon Films** (Invited)  
15:35-16:05 Naoto Ohtake (Tokyo Institute of Technology, Japan)
- OS2-11 **Amorphous Metal-Carbon Nanocomposites and Their Applications**  
16:05-16:20 Toshiyuki Takagi, Takanori Takeno, Hiroyuki Miki (Tohoku University, Japan), Alexei Bozhko (Moscow State University, Russia)
- 16:20-16:30 Break
- [Tribology (3)] Chair: Sam Zhang (Nanyang Technological University, Singapore)
- OS2-12 **Tribological Properties of Diamond-Like Carbon Films in a Water Environment** (Invited)  
16:30-17:00 Tsuguyori Ohana (Invited Speaker) and Akihiro Tanaka (National Institute of Advanced Industrial Science and Technology (AIST), Japan)



- [Innovation] Chair: T. Sawada (Keio University, Japan)  
 OS3-7 **Development of Intelligent Fluid Using Multiphase Flow**  
 16:50-17:10 K. Yoshida, H. Sirako and I. Kataoka (Osaka University, Japan)
- OS3-8 **Mathematical Simulation of Flexible Fiber Motion in Turbulent Flows**  
 17:10-17:30 M. Shams (K. N. Toosi University of Technology, Iran) and G. Ahmadi  
 (Clarkson University, USA)
- OS3-9 **Impact of Liquid Drops on Solid Substrates with Micro Grooves**  
 17:30-17:50 D. Sivakumar, K. Katagiri, T. Sato and H. Nishiyama (Tohoku University,  
 Japan)
- OS3-10 **A Novel Concept Solar Energy Powered Rankine Cycle Using Supercritical  
 CO<sub>2</sub>**  
 17:50-18:10 X. R. Zhang, H. Yamaguchi (Doshisha University, Japan), K. Fujima  
 (Mayekawa MFG. Co., Ltd., Japan), M. Enomoto (Showa Denko K. K., Japan)  
 and N. Sawada (Showa Tansan Co., Ltd., Japan)
- OS3-11 **Numerical Simulation on Transient Responses of Plasma Direct Energy  
 Conversion System**  
 18:10-18:30 H. Takana (Tohoku University, Japan), Y. Okuno and H. Yamasaki (Tokyo  
 Institute of Technology, Japan)

November 12, 2004

- [MR Suspensions] Chair: M. Nakano (Yamagata University, Japan)  
 OS3-12 **Engineering with Magnetorheological Fluids** (Invited)  
 10:20-11:00 J. D. Carlson (Lord Corporation, USA)
- OS3-13 **Membrane Formation Using Functional Fluids for Flow Control Application**  
 11:00-11:20 H. Yamaguchi, T. Kuwahara, A. Nakajima (Doshisha University, Japan) and  
 H. Nishiyama (Tohoku University, Japan)
- OS3-14 **Torque Characteristics of a Clinical Rehabilitation Teaching Robot Using  
 MR-Fluid Clutches for a Knee Joint**  
 11:20-11:40 H. Hakogi, M. Ohaba, N. Kuramochi (Toin University of Yokohama, Japan)  
 and H. Yano (Sendai Medical Technology College, Japan)
- OS3-15 **Magnetic Fluid Devices for Driving Micro Machines**  
 11:40-12:00 S. Sudo, Y. Takaki, Y. Hashiguchi (Iwaki Meisei University, Japan) and H.  
 Nishiyama (Tohoku University, Japan)
- 12:00-13:30 Lunch

- [Magnetic Fluid] Chair: S. Sudo (Iwaki Meisei University, Japan)  
 OS3-16 **Characteristic Properties of Ultrasonic Propagation Velocity in Magnetic  
 Fluids under Magnetic Field**  
 13:30-13:50 M. Motozawa, Y. Matsumoto and T. Sawada (Keio University, Japan)

- OS3-17            **Rheological and Magnetic Characteristics of Amorphous Compound Fluid**  
 13:50-14:10    K. Shimada (Fukushima University, Japan), A. Shibayama (Akita University, Japan) and E. Yuze (Akita Prefectural Resources Technology, Japan)
- OS3-18            **Basic Equations and Constitutive Equations of Micropolar Ferrofluids**  
 14:10-14:30    Y. Ido (Nagoya Institute of Technology, Japan)
- 14:30-14:50     Break
- [ER Fluids]      Chair: H. Yamaguchi (Doshisha University, Japan)  
 OS3-19            **Dynamic Shear Flow Behavior of Electro-Rheological Suspensions between Two Rotating Parallel Disks**  
 14:50-15:10    M. Nakano, S. Koizumi and K. Tsuge (Yamagata University, Japan)
- OS3-20            **Flow Characteristics of a Liquid Crystal Mixture in the Circular Pipe Electrodes**  
 15:10-15:30    T. Tsukiji, E. Koyabu (Sophia University, Japan), T. Tsuji and S. Chono (Kochi University of Technology, Japan)
- OS3-21            **Flow Rate Estimation of Liquid Crystal in a Minute ER Device with Patterned Electrodes**  
 15:30-15:50    T. Narumi (Niigata University, Japan), Y. Yamaguchi, N. Sasaki (Niigata University, Japan) and T. Hasegawa (Niigata University, Japan)
- OS3-22            **Thickness Control of a Liquid Crystal Film in a Sliding Bearing by Electric Fields**  
 15:50-16:10    Y. Matsumura (Hitotsubashi University, Japan), S. Morishita and T. Shiraishi (Yokohama National University, Japan)

**Room2**

**OS 4 Force Generation through Shock Wave Dynamics**

November 12, 2004

- [Engines]        Chair: Goro Masuya (Tohoku University, Japan)  
 OS4-1            **Scramjet Engine Tests at JAXA-Kakuda (Invited)**  
 10:30-11:00    Nobuo Chinzei (Japan Aerospace Exploration Agency (JAXA), Japan)
- OS4-2            **Heat Flux Prediction for Scramjet Engines**  
 11:00-11:20    Toshinori Kouchi (Tohoku University, Japan), Tohru Mitani, Tetsuo Hiraiwa, Masatoshi Kodera (Japan Aerospace Exploration Agency (JAXA), Japan) and Goro Masuya (Tohoku University, Japan)
- OS4-3            **Conceptual Studies of Ramjet-Rocket Combined-Cycle Engine**  
 11:20-11:40    Takeshi Kanda (Japan Aerospace Exploration Agency (JAXA), Japan)

- OS4-4  
11:40-12:00      **Designs of Variable Mach Number Nozzles and Scramjet Inlet Tests**  
Eijiro Kitamura (Tohoku University, Japan), Tohru Mitani, Masahiro Takahashi (Japan Aerospace Exploration Agency (JAXA), Japan), LiHong Chen (Institute of Mechanics, China) and Goro Masuya (Tohoku University, Japan)
- 12:00-13:30      Lunch
- [Laser Propulsion]Chair: Shigeo Obata (National Defense Academy, Japan)
- OS4-5  
13:30-13:50      **Propulsion Performance of Laser-Driven In-Tube Accelerator (LITA)**  
Toshiro Ohtani and Yu Xilong (Tohoku University, Japan)
- OS4-6  
13:50-14:10      **Blast Wave Expansion and Impulse Generation Characteristics for Monatomic Gases in Laser-Driven In-Tube Accelerator**  
Yu Xilong, Toshiro Ohtani, Sukyung Kim, Toshihiro Ogawa, In-Seuck Jeung, and Akihiro Sasoh (Tohoku University, Japan)
- OS4-7  
14:10-14:30      **Useful Propulsive Impulse Generation Powered by Laser Energy in Low Ambient Pressure**  
Keiko Watanabe and Akihiro Sasoh (Tohoku University, Japan)
- OS4-8  
14:30-14:50      **Preliminary Experiments on the Interaction between the Laser-Generated Gas Breakdown and a Shock Wave**  
Koichi Mori and Akihiro Sasoh (Tohoku University, Japan)
- 14:50-15:10      Break
- [Shock Wave] Chair: Takeshi Kanda (Japan Aerospace Exploration Agency (JAXA), Japan)
- OS4-9  
15:10-15:30      **The Shock Induced Mixing of Helium Gas into Supersonic Air Stream from the Inside of Boundary Layer**  
Shigeo Obata (National Defense Academy, Japan)
- OS4-10  
15:30-15:50      **Combustion of Hydrogen Jet under Interaction with Shock Waves in a Supersonic Air-Stream**  
Hisashi Nakamura, Hideaki Kobayashi, Susumu Hasegawa, Goro Masuya (Tohoku University, Japan), and Takashi Niioka (Akita Prefectural University, Japan)
- OS4-11  
15:50-16:10      **Study on Supersonic Internal Flows with Pseudo-Shock Waves**  
Hiromu Sugiyama, Kazuhide Mizobata, Ryojiro Minato, Akira Tojo, and Yohei Muto (Muroran Institute of Technology, Japan)
- OS4-12  
16:10-16:30      **Pseudo-shock Waves Produced by Heat Addition in Supersonic Duct Flow with a Diverging Section**  
Goro Masuya, Minh Han, Masahiro Amano, and Kenichi Takita (Tohoku University, Japan)

**Room5****OS5 Alleviation of Shock-Induced Impacts**

November 11, 2004

[Shock Impacts in Earth Science] Chair: Koichi Mori (Tohoku University, Japan)

OS5-1 **Volcanic Blast Wave: A Review and Our Recent Attempt** (Invited)

10:20-10:40 Hiromitsu Taniguchi (Tohoku University, Japan)

OS5-2 **Analogous Experiments of Volcanic Eruption Flow Dynamics**

10:40-11:00 Takeshi Furukawa, Akihiro Sasoh, Akio Goto and Hiromitsu Taniguchi (Tohoku University, Japan)

OS5-3 **Shock-Induced Hazards by Extraterrestrial Impacts and Its Alleviation**

11:00-11:20 Yasunori Miura (Yamaguchi University, Japan)

OS5-4 **Development of Diaphragm-Less Gas Gun Useful for Shock-Induced Impact Studies**

11:20-11:40 Shin Oshiba, Takeshi Furukawa and Akihiro Sasoh (Tohoku University, Japan)

[Safety against Shock Impacts] Chair: Akihiro Sasoh (Tohoku University, Japan)

OS5-5 **Safety Development against Explosive Hazards** (Invited)

14:00-14:40 Masatake Yoshida (National Institute of Advanced Industrial Science and Technology (AIST), Japan)

OS5-6 **Determination of the Compressive Failure Threshold of Brittle Materials**

14:40-15:20 (Invited)

Eugene Zaretsky (Tohoku University, Japan / Ben-Gurion University, Beer-Sheva, Israel)

15:20-15:40 Break

[Sonic Boom (1)] Chair: Kazuhiro Nakahashi (Tohoku University, Japan)

OS5-7 **Multi-Fidelity Design of Low-Boom Supersonic Jets** (Invited)

15:40-16:20 Juan J. Alonso, Seongim Choi, Ilan Kroo (Stanford University, U.S.A.), and Mathias Wintzer (Desktop Aeronautics, U.S.A.)

OS5-8 **Multi-Objective Optimization for Low-Drag/Low-Boom Design with Robust Objective Function**

16:20-16:40 Yoshikazu Makino (Japan Aerospace Exploration Agency (JAXA), Japan) and Ilan Kroo (Stanford University, U.S.A.)

16:40-16:50 Break

[Sonic Boom (2)] Chair: Yoshikazu Makino (Japan Aerospace Exploration Agency (JAXA), Japan)

OS5-9/ OS1-11 **A New Concept in the Development of Boomless Supersonic Transport Aircraft** (Invited)

16:50-17:30 Kazuhiro Kusunose (Tohoku University, Japan)







**Session 1**

10:20-11:04 Short Oral Presentation  
(3 min presentation + 1 min PC preparation for each paper)

11:05-11:55 Poster Presentation

OS8B-1 **Effects of Various D2 Injection Angle Positioning on DF Chemical Laser Performance** (Invited)

Jun Sung Park and Seung Wook Baek (Korea Advanced Institute of Science and Technology (KAIST), Korea)

OS8B-2 **A Study on the Effect of Stratified Mixture Formation on Combustion Characteristics in a Constant Volume Combustion Chamber** (Invited)

C. H. Lee and K. H. Lee (Hanyang University, Korea)

OS8B-3 **Structural and Morphological Changes of Incipient Soot Particles in Inverse Diffusion Flames**

Kwang Chul Oh, Uen Do Lee, and Hyun Dong Shin (Korea Advanced Institute of Science and Technology (KAIST), Korea)

OS8B-4 **Ignition Characteristics of Premixed Gases Flowing in a Heated Narrow Channel**

Takuya Kataoka, Nam Il Kim, Takeshi Yokomori, Shigenao Maruyama, and Kaoru Maruta (Tohoku University, Japan)

OS8B-5 **In-Situ Observation of Crystal Growth Using Real-Time Phase Shifting Interferometer and Temperature Controlling Test Cell**

Kohei Ueno, Shigenao Maruyama, and Atsuki Komiya (Tohoku University, Japan)

OS8B-6 **Design and Synthesis of CdS Nanoparticles for Efficient Splitting of Hydrogen Sulphide under Sunlight**

Takeo Arai, Yoshinori Sato, Kozo Shinoda, Balachandran Jeyadevan, and Kazuyuki Tohji (Tohoku University, Japan)

OS8B-7 **Motion of Nanoparticles in Rarefied Gas Flows**

K. Nanbu and T. Otsuka (Tohoku University, Japan)

OS8B-8 **Fracture Due to Oxygen Potential Gradients in Samarium-Doped Ceria Solid Oxide Fuel Cell**

Kazuhisa Sato, Keiichi Yashiro, Toshiyuki Hashida, and Junichiro Mizusaki (Tohoku University, Japan)

OS8B-9 **Numerical Simulation of Vortex-Surface Interaction Sound**

Masaaki Mori, Nozomu Hatakeyama, and Osamu Inoue (Tohoku University, Japan)

OS8B-10 **Intrinsic Instabilities of Hydrogen/Air premixed Planar Flames under High Pressure**

Kazuya Tsuboi and Goro Masuya (Tohoku University, Japan)

OS8B-11 **PIV Measurement of Longitudinal Vortices Produced by Ramp and Twin Jets**

Shunsuke Koike and Goro Masuya (Tohoku University, Japan)

12:00-13:30 Lunch

**Session 2**

13:30-14:14

Short Oral Presentation

(3 min presentation + 1 min PC preparation for each paper)

14:15-15:05

Poster Presentation

OS8B-12

**Pressure Field Measurement in Unsteady Shock Wave Phenomena Using Pressure-Sensitive Paint**

Aya Nishikawa, Yu Xilong, Akihiro Sasoh, and Keisuke Asai (Tohoku University, Japan)

OS8B-13

**Evaluation of Roughness Effects on a Hydraulically Induced Slip and on a Fluid Flow into a Fracture**

Katsumi Nemoto, Hirokazu Moriya, and Hiroaki Niitsuma (Tohoku University, Japan)

OS8B-14

**Mathematical Modeling of Oxygen Plasma for Sterilization Processes**

Takashi Misaka and Satoyuki Kawano (Tohoku University, Japan)

OS8B-15

**Numerical Solutions for Oldroyd-B Fluid Temperature Distributions in Pipe-Liked Domains**

F. Rashidi and R. Alizadeh (AmirKabir University of Technology, Iran)

OS8B-16

**An Experimental Study on the Lift-off Characteristics of the Triple Flame with Concentration Gradient and Mean Velocity**

Jeong Il Seo, Kwang Chul Oh, Hyun Dong Shin (Korea Advanced Institute of Science and Technology (KAIST), Korea), and Nam Il Kim (Tohoku University, Japan)

OS8B-17

**The Effects of Heat Loss on the Burning Velocity in a Micro Combustor**

(Invited)

Hanbee Na (Korea Aerospace Research Institute, Korea), Dae Hoon Lee (Korea Institute of Machinery and Materials, Korea), Won Young Choi, and Sejin Kwon (Korea Advanced Institute of Science and Technology (KAIST), Korea)

OS8B-18

**The Design, Fabrication and Performance Evaluation of a Micro Catalytic Reactor for Reforming Methanol**

Taekyu Kim (Korea Advanced Institute of Science and Technology (KAIST), Korea), Dae Hoon Lee (Korea Institute of Machinery and Materials, Korea), and Sejin Kwon (Korea Advanced Institute of Science and Technology (KAIST), Korea)

OS8B-19

**Experiment on Cryoprobe Taking Account of Precise Heat Transfer Control**

Kazuto Nakagawa, Shigenao Maruyama, and Atsuki Komiya (Tohoku University, Japan)

OS8B-20

**Ion Transport Phenomena and Nano-Structure Effect in Sintered Materials**

Shinya Isaka, Atsushi Kaimai, Keiji Yashiro, Hiroshige Matsumoto, Tatsuya Kawada, Junichiro Mizusaki (Tohoku University, Japan)

OS8B-21

**Molecular Dynamics Analysis of Ionic Conductivity and Elastic Modulus in Ceria Ceramics**

Kazuhisa Sato, Ken Suzuki, Toshiyuki Hashida, and Junichiro Mizusaki (Tohoku University, Japan)

- OS8B-22      **The Application of FT-IR for the In Situ Investigation of High Temperature Electrodes of SOFC**  
Takuya Murai, Keiji Yashiro, Atsushi Kaimai, Tatsuya Kawada, and Junichiro Mizusaki (Tohoku University, Japan)
- 15:10-15:25      Break
- Session 3**
- 15:25-16:09      Short Oral Presentation  
(3 min presentation + 1 min PC preparation for each paper)
- 16:10-17:00      Poster Presentation
- OS8B-23      **An Experimental and Numerical study on the Uneven Flow Distribution in the Windbox of an Oil-Fired Boiler** (Invited)  
Young Gun Go (Korea Advanced Institute of Science and Technology (KAIST), Korea), Young-Zoo Kim (Korea Electric Power Research Institute, Korea), and Sangmin Choi (Korea Advanced Institute of Science and Technology (KAIST), Korea)
- OS8B-24      **Growth of Flame Instability and the Effect on Turbulent Combustion in High Pressure and High Temperature Conditions**  
Hirokazu Hagiwara, Hideaki Kaneko, Yasuhiro Ogami, and Hideaki Kobayashi (Tohoku University, Japan)
- OS8B-25      **A Numerical Study of Polypropylene Combustion Process in Counterflow Diffusion Flame**  
Kentaro Yoshinaga and Hideaki Kobayashi (Tohoku University, Japan)
- OS8B-26      **Comparison of Radiation Element Method and Discrete Ordinates Interpolation Method Applied to Three-Dimensional Radiative Heat Transfer**  
Atsushi Sakurai (Tohoku University, Japan), Tae-Ho Song (Korea Advanced Institute of Science and Technology (KAIST), Korea), Shigenao Maruyama (Tohoku University, Japan), and Hyun Keol Kim (Korea Advanced Institute of Science and Technology (KAIST), Korea)
- OS8B-27      **Effect of Varying Heat Transfer Rate on the Formation of Macrosegregation during Solidification of Aluminum-Copper Alloys** (Invited)  
Beom Soo Seo and Do Hyung Choi (Korea Advanced Institute of Science and Technology (KAIST), Korea)
- OS8B-28      **Preparation and Mechanical Evaluation of Carbon Nanotube Solids**  
Go Yamamoto, Yoshinori Sato, Toru Takahashi, Mamoru Omori, Kazuyuki Tohji, and Toshiyuki Hashida (Tohoku University, Japan)
- OS8B-29      **Application of Bacterial Polysulfide Reduction for Hydrogen Generation with Sulfur Cycle**  
Yui Takahashi, Koichi Suto, Chihiro Inoue, and Tadashi Chida (Tohoku University, Japan)
- OS8B-30      **Effects of pH Value on Reduction of Carbon Dioxide under Hydrothermal Conditions**  
Takamasa Onoki, Toshinari Kori, Nakamichi Yamasaki, and Toshiyuki Hashida (Tohoku University, Japan)

- OS8B-31      **Generalized Annular Couette Flow of a Non Ideal Bingham Plastic Fluid**  
Fariborz Rashidi and Behzad Khodakarami (Amirkabir University of  
Technology, Iran)
- OS8B-32      **Optimization of In-Flight Particle Characteristics in a DC-RF Hybrid Plasma  
Flow System**  
K. Kawajiri and H. Nishiyama (Tohoku University, Japan)
- OS8B-33      **Measurement of Upwelling Flow Verocity Generated by the Perpetual Salt  
Fountain in the Pacifid Ocean**  
H. Mitsugashira, K. Tsubaki, S. Maruyama, and A. Komiya (Tohoku  
University, Japan)

# AFI/TFI-2004 Program

## Tachibana

## Plenary Lecture

November 11, 2004

[TFI Plenary Lecture]

9:10-10:10      **Combined Heat, Air, Moisture, and Pollutants Transport in Building Environmental Systems**

Jianshun Zhang (Syracuse University, U.S.A.)

[AFI Plenary Lecture]

13:00-14:00      **Intelligent Systems: Shaping the Future of Aeronautics and Space Exploration**

Kalmanje KrishnaKumar, Jason Lohn and John Kanashige (NASA Ames Research Center, U.S.A.)

## Shirakashi 2

## MS1 Fluid Informatics in Bio-Fluid Systems

November 12, 2004

[Flows in Blood Vessel]    Chair: Satoyuki Kawano (Tohoku University, Japan)

10:10-10:20      MS1 Opening

MS1-1              **MRI Based Validation of CFD in the Cardiovascular System**

10:20-10:45      Shigeo Wada(Tohoku University, Japan), Masanori Nakamura (University of Gent, Belgium), Suguru Yokosawa (Tohoku University, Japan), Haruo Isoda (Hamamatsu Medical University, Japan), Ken-ichi Tsubota and Takami Yamaguchi (Tohoku University, Japan)

MS1-2              **Development of Simulation System of Hemodynamics based on VOF-FVM with Rectangular Coordinate**

10:45-11:10      Hidehito Iwase, Ryutaro Himeno (RIKEN, Japan), Kazuaki Fukasaku (Kasukabe Central Hospital, Japan) and Shigeho Noda (Fujitsu Nagano System Engineering, Japan)

MS1-3              **Ultrasonic-Measurement-Integrated Simulation of Blood Flow in the Aorta with an Aneurysm**

11:10-11:35      Kenichi Funamoto, Toshiyuki Hayase, Yoshifumi Saijo and Tomoyuki Yambe (Tohoku University, Japan)

MS1-4                    **Effect of the Blood Vessel Viscoelasticity on the Blood Pressure Wave Propagation: Numerical Analysis Using One-Dimensional Viscoelastic Tube Model**  
11:35-12:00  
Tomoki Kitawaki (Okayama University, Japan) and Masashi Shimizu (Tokyo Institute of Technology, Japan)

12:00-13:30        Lunch

[MS1 Keynote Lecture]    Chair: Toshiyuki Hayase (Tohoku University, Japan)

MS1-5                    **Quantitative Flow Visualization and Its Application to Biological Flows**  
13:30-14:30        (Invited)  
Mory Gharib (California Institute of Technology, U.S.A.)

[Flows in Cell Scale]        Chair: Shigeo Wada (Tohoku University, Japan)

MS1-6                    **Effect of Cell Stiffness on Transit Through Pulmonary Capillary Network**  
14:30-14:55        Atsushi Shirai, Ryo Fujita, and Toshiyuki Hayase (Tohoku University, Japan)

MS1-7                    **Numerical Simulation of Deformation of a Red Blood Cell in Small Blood Vessel**  
14:55-15:20  
Kiyoshi Bando and Kenkichi Ohba (Kansai University, Japan)

MS1-8                    **Development of Drug Delivery Systems using Shock Wave and Bubble Collapsing**  
15:20-15:45  
Ichiro Yamanoi (Kyoto Univeristy, Japan) and Masaaki Tamagawa (Kyushu Institute of Technology, Japan)

MS1-9                    **Ultrasound Mediated Gene Expression using Microbubbles**  
15:45-16:10  
Tetsuya Kodama (Tohoku University, Japan), Yukio Tomita (Hokkaido University of Education, Japan), Kenichiro Koshiyama (Hokkaido University, Japan) and Martin Blomley (Imperial College London, U.K.)

16:10-16:25        Break

[Flows in DNA Scale]        Chair: Masaaki Tamagawa (Kyushu Institute of Technology, Japan)

MS1-10                    **Molecular Dynamics Simulation of Cell Permeabilization Induced by Shock Wave Impulse**  
16:25-16:50  
Kenichiro Koshiyama (Hokkaido University, Japan), Tetsuya Kodama (Tohoku University, Japan), Takeru Yano and Shigeo Fujikawa (Hokkaido University, Japan)

MS1-11                    **Fractal Dimension Analysis in Self-Assembled Poly(dA) · Poly(dT) DNA Network on Mica Surface**  
16:50-17:15  
Satoyuki Kawano (Tohoku University, Japan)

MS1-12            ***Ab Initio* Study of DNA Double Strand Breaks by Hydroxyl Radical**  
17:15-17:40      Youhei Maruyama (Tohoku University, Japan), Masanori Tachikawa  
(Yokohama City University, Japan), and Satoyuki Kawano (Tohoku  
University, Japan)

**Tachibana            MS2 Fusion of Biotechnology and Nanotechnology (Invited Session)**

November 11, 2004

Chair: Seiji Samukawa (Tohoku University, Japan)

MS2-1            **Introductory Talk / The Fusion of Biology and Nanotechnology**  
14:10-14:20      **(Semiconductor Technology) toward the New Nano-generation**  
Ichiro Yamashita (Matsushita Electric Industrial Co., Ltd., Japan)

MS2-2            **Applications of Cowpea Mosaic Virus as an Addressable Platform for Nano**  
14:20-15:00      **Technology (Invited)**  
John E. Johnson (The Scripps Research Institute, U.S.A.)

MS2-3            **Integration of Bio-functional Materials on Si and Application to Supported**  
15:00-15:35      **Membrane Biosensors**  
Tsuneo Urisu (Institute for Molecular Science, Japan)

MS2-4            **Nano/Microfabrication Technologies for Nanobio-devices**  
15:35-16:10      Takanori Ichiki (The University of Tokyo, Japan)

16:10-16:25      Break

Chair: Ichiro Yamashita (Matsushita Electric Industrial Co., Ltd., Japan)

MS2-5            **Stimuli-responsive Materials for Nano- and Microtechnology**  
16:25-17:00      Takao Aoyagi (Kagoshima University, Japan)

MS2-6            **Biological Pathway to the Nanoscale Electronic Devices**  
17:00-17:35      Shigeo Yoshii and Ichiro Yamashita (Matsushita Electric Industrial Co., Ltd.,  
Japan)

MS2-7            **Bio-nano Process and Ultimate Top-down Etching**  
17:35-18:10      Seiji Samukawa (Tohoku University, Japan)

**Room 1            MS3 Advanced Fluid Information and Aerospace Applications**

November 11, 2004

[Computation and Measurement] Chair: Kisa Matsushima (Tohoku University, Japan)

MS3-1            **Drag Prediction and Decomposition Based on CFD Computations**  
10:30-10:50      Wataru Yamazaki, Kisa Matsushima and Kazuhiro Nakahashi (Tohoku  
University, Japan)

- MS3-2                    **Possibility of Particle Image Velocimetry in CFD Code Validation**  
 10:50-11:10         Shigeya Watanabe, Hiroyuki Kato, Zhong Lei, Taro Imamura and Shunji Enomoto (Japan Aerospace Exploration Agency (JAXA), Japan)
- MS3-3                    **The Measurement of Fluctuating Pressures Induced by Submerged High-Speed Gas Jet**  
 11:10-11:30         Hong-Hui Shi, Bo-Yi Wang, Long-Xi Qi, Qi Li and Bing Yang (Chinese Academy of Sciences, China)
- 11:30-13:00         Lunch
- [MS3 Invited Lecture]    Chair: Shigeru Obayashi (Tohoku University, Japan)
- MS3-4                    **An Intelligent Systems Approach to Data-Model Fusion and Analysis in Aerodynamics (Invited)**  
 14:30-15:30         Andrew J. Meade (William Marsh Rice University, U.S.A.)
- 15:30-15:50         Break
- [Aeroelasticity]        Chair: Masaki Kameyama (Tohoku University, Japan)
- MS3-5                    **Aeroelastic Analysis of a Wing with Freeplay in the Subsonic/Transonic Regions**  
 15:50-16:10         Jae-Han Yoo, Young-Keun Park, In Lee and Jae-Hung Han (Korea Advanced Institute of Science and Technology (KAIST), Korea)
- MS3-6                    **Aeroelastic Analysis of Bearingless Rotors with Composite Flexbeam using a Large Deflection Beam Theory**  
 16:10-16:30         In-Gyu Lim, In Lee and Jae-Hung Han (Korea Advanced Institute of Science and Technology (KAIST), Korea)
- MS3-7                    **Numerical Investigation on the Aeroelastic Instability of Complete Aircraft Model**  
 16:30-16:50         Jong-Yun Kim, Hyuk-Jun Kwon, Kyung-Seok Kim, In Lee and Jae-Hung Han (Korea Advanced Institute of Science and Technology (KAIST), Korea)
- 16:50-17:10         Break
- [CFD]                    Chair: K. Yamamoto (Japan Aerospace Exploration Agency (JAXA), Japan)
- MS3-8                    **Numerical Simulation of Boundary Layer Flows of a Low Pressure Turbine Cascade using LES**  
 17:10-17:30         Yoshinori Ooba (Ishikawajima-Harima Heavy Industries Co., Ltd., Japan), Chuichi Arakawa (The University of Tokyo, Japan) and Yuichi Matsuo (Japan Aerospace Exploration Agency (JAXA), Japan)



MS3-9                    **CIVA (Cubic Interpolation with Volume/Area Coordinates) and AMR (Adaptive Mesh Refinement) Method for Discrete Boltzmann Equation**  
17:30-17:50            Taku Ozawa (The Japan Research Institute, Limited, Japan) and Takahiko Tanahashi (Keio University, Japan)

MS3-10                  **Evaluation and Application of Higher-Order Elements to GSMAC-FEM**  
17:50-18:10            Gaku Hashimoto and Takahiko Tanahashi (Keio University, Japan)

MS3-11                  **Numerical Scheme for Incompressible Fluid using Helmholtz-Elements**  
18:10-18:30            Junya Imamura (IMI Computational Engineering Laboratory, Japan) and Takahiko Tanahashi (Keio University, Japan)

November 12, 2004

[Optimization] Chair: Shinkyu Jeong (Tohoku University, Japan)

MS3-12                  **Design under Uncertainties of 3D Airfoils in Transonic Field**  
10:10-10:30            Lucia Parussini, Valentino Pediroda (University of Trieste, Italy) and Shigeru Obayashi (Tohoku University, Japan)

MS3-13                  **Integrating Multibody Simulation and CFD: toward Complex Multidisciplinary Design Optimisation**  
10:30-10:50            Stefano Pieri (ES.TEC.O.srl, Italy), Carlo Poloni (University of Trieste, Italy) and Martin Mühlmeier (AUDI Motor Sport AG, Germany)

MS3-14                  **Unstructured Adjoint Method for Navier-Stokes Equations**  
10:50-11:10            Hyoung-Jin Kim and Kazuhiro Nakahashi (Tohoku University, Japan)

MS3-15                  **High-Lift System Optimization Based on Kriging Model Using High Fidelity Flow Solver**  
11:10-11:30            Masahiro Kanazaki (Japan Aerospace Exploration Agency (JAXA), Japan), Shinkyu Jeong (Tohoku University, Japan) and Mitsuhiro Murayama (Japan Aerospace Exploration Agency (JAXA), Japan)

MS3-16                  **Multidisciplinary Design Optimization of Wing Shape for Regional Jet**  
11:30-11:50            Kazuhisa Chiba, Shigeru Obayashi, Kazuhiro Nakahashi (Tohoku University, Japan) and Hiroyuki Morino (Mitsubishi Heavy Industries, Ltd., Japan)

**Room 1                    MS4 Collaborative Visualization and Volume Communication**

November 12, 2004

[Invited Lecture] Chair: Koji Koyamada (Kyoto University, Japan)

MS4-1                    **Distributed Visualization and Analysis of Fluid Dynamics Data (Invited)**  
13:30-14:30            Hans-Christian Hege, Tino Weinkauff, Steffen Prohaska, and Andrei Hutanu (Zuse Institute Berlin, Germany)

- 14:30-14:40 Break
- Chair: Susumu Shirayama (The University of Tokyo, Japan)
- MS4-2  
14:40-15:00 **Scientific Collaborative Visualization in Shared Virtual Environment with PDA-based Control and 3-D Annotation Interface**  
Nobuyuki Kukimoto (Tohwa University, Japan), Jorji Nonaka, Yasuo Ebara and Koji Koyamada (Kyoto University, Japan)
- MS4-3  
15:00-15:20 **Research and Development of the Visualization Grid in ITBL Project**  
Yuriko Takeshima, Yoshio Suzuki, Nobuko Matsumoto, Kazunori Sai and Norihiro Nakajima (Japan Atomic Energy Research Institute, Japan)
- MS4-4  
15:20-15:40 **3D Modeling and Displaying System for Volume Communication**  
Naohisa Sakamoto (Kyoto University, Japan), Nobuyuki Kukimoto (Tohwa University, Japan), Yukio Yasuhara, Yasuo Ebara and Koji Koyamada (Kyoto University, Japan)
- MS4-5  
15:40-16:00 **Remote Visualization Framework for Promoting Cooperative Visualization**  
Jorji Nonaka (Kyoto University, Japan), Nobuyuki Kukimoto (Tohwa University, Japan), Masahiro Watanabe (Japan Advanced Institute of Science and Technology, Japan), Yasuo Ebara (Kyoto University, Japan), Teruo Matsuzawa (Japan Advanced Institute of Science and Technology, Japan), Masanori Kanazawa and Koji Koyamada (Kyoto University, Japan)
- MS4-6  
16:00-16:20 **Adjustment of Volume Communications Environment to Medical Treatment**  
Masahiro Watanabe (Japan Advanced Institute of Science and Technology, Japan), Koji Koyamada (Kyoto University, Japan) and Teruo Matsuzawa (Japan Advanced Institute of Science and Technology, Japan)
- MS4-7  
16:20-16:40 **Potentials of Level-Set Graphs for Visual Exploration of Large-Scale Datasets**  
Issei Fujishiro (Tohoku University, Japan), Shigeo Takahashi (The University of Tokyo, Japan) and Yuriko Takeshima (Japan Atomic Energy Research Institute, Japan)

**Shirakashi 1&2 MS5 5th Japan-Korea Seminar on Combustion and Heat Transfer & CERC Workshop**

November 11, 2004

- Chair: Hideaki Kobayashi (Tohoku University, Japan)
- 10:30-10:40 **MS5 Opening**  
Hideaki Kobayashi (Tohoku University, Japan) and Hyun Dong Shin (Korea Advanced Institute of Science and Technology (KAIST), Korea)

- MS5-1  
10:40-10:50 **The Effects of Radiation Shield and Laser Heating on the Soot Formation and Oxidation of Diffusion Flame** (Invited)  
Chun Beom Lee (KATECH, Korea) and Hyun Dong Shin (Invited speaker) (Korea Advanced Institute of Science and Technology (KAIST), Korea)
- MS5-2  
10:50-11:00 **Correlation of Burning Rate of the Interacting Liquid Droplets with Internal Circulation**  
Ho Young Kim, Chong Pyo Cho, and Jin Taek Chung (Korea University, Korea)
- MS5-3  
11:00-11:10 **Flammable Limits of a Premixed Flame in a Small Combustor**  
Nam Il Kim (Tohoku University, Japan), Souichiro Kato (Ishikawajima-Harima Heavy Industry Co., Ltd., Japan), Takuya Kataoka, Takesi Yokomori (Tohoku University, Japan), Toshiro Fujimori (Ishikawajima-Harima Heavy Industry Co. Ltd., Japan), Shigenao Maruyama and Kaoru Maruta (Tohoku University, Japan)
- MS5-4  
11:10-11:20 **Effects of Addition of Carbon Dioxide on Thermal Characteristics in Oxygen-Enriched Hydrogen Flame**  
Chang Yeop Lee, Seung Wook Baek, and Joon Won Choi (Korea Advanced Institute of Science and Technology (KAIST), Korea)
- MS5-5  
11:20-11:30 **Extinction Limit of Counterflow Premixed Flame under Various Pressures**  
Kenichi Takita, Hiroyuki Yamazaki, Takuya Uchida, and Goro Masuya (Tohoku University, Japan)
- 11:30-13:00 Lunch  
  
Chair: Hyun Dong Shin (Korea Advanced Institute of Science and Technology (KAIST), Korea)
- MS5-6  
14:20-14:30 **Experimental Investigation of Liquid Helium Pressurization Method for Liquid Propellant Rocket**  
Sehwan In, Sangkwon Jeong, and Youngkwon Kim (Korea Advanced Institute of Science and Technology (KAIST), Korea)
- MS5-7  
14:30-14:40 **Development of the WSGGM with a Gray Gas Regrouping Technique for the Solution of the Radiative Transfer through Nonuniform Gas Mixtures**  
Won-Hee Park, Bum-Jin Jo, and Tae-Kuk Kim (Chung-Ang University, Korea)
- MS5-8  
14:40-14:50 **Effect of Fuel Characteristics on the Thermal Processes in an Iron Ore Sintering Bed**  
Won Yang and Sangmin Choi (Korea Advanced Institute of Science and Technology (KAIST), Korea)

- MS5-9  
14:50-15:00 **Effects of Turbulence on Flame Structure and NO<sub>x</sub> Emission of Turbulent Jet Non-premixed Flames in High-Temperature Air Combustion**  
Hideaki Kobayashi, Ken Oono (Tohoku University, Japan), Eun-Seong Cho (Seoul National University, Korea), Hirokazu Hagiwara, Yasuhiro Ogami (Tohoku University, Japan), and Takashi Niioka (Akita Prefectural University, Japan)
- MS5-10  
15:00-15:10 **Numerical Simulation on Oscillating Lifted Flames in Coflow Jet with Gravity Level Variation**  
J. Kim, K. N. Kim, S. H. Won, and S. H. Chung (Seoul National University, Korea)
- MS5-11  
15:10-15:20 **Propagation Behavior of Premixed Flame Passing through Droplets**  
Yoshio Nunome, Kentaro Yoshinaga, Masao Kawase (Tohoku University, Japan), Hironao Hanai (Chiba Institute of Science, Japan), Hideaki Kobayashi (Tohoku University, Japan) and Takashi Niioka (Akita Prefectural University, Japan)
- 15:20-15:35 Break
- Chair: S. H. Chung (Seoul National University, Korea)
- MS5-12  
15:35-15:45 **Assessment of the Organization of a Turbulent Separated and Reattaching Flow by Measuring Wall Pressure Fluctuations**  
W. Kang, Y. Z. Liu, and H. J. Sung (Korea Advanced Institute of Science and Technology (KAIST), Korea)
- MS5-13  
15:45-15:55 **Characteristics of the Flow around and inside of the Rotating Porous Disk**  
Vladimir K. Baev and Sergey S. Minaev (Institute of Theoretical and Applied Mechanics, Russia)
- MS5-14  
15:55-16:05 **Dynamics of Cellular Premixed Flames Generated by Intrinsic Instability**  
Satoshi Kadowaki, Hiroshi Suzuki (Nagaoka University of Technology, Japan), and Hideaki Kobayashi (Tohoku University, Japan)
- MS5-15  
16:05-16:15 **Self-induced Combustion Instability of Laminar Premixed Flames on a Slot Burner**  
Wonnam Lee (Dankook University, Korea), Jong-Guen Lee, and Domenic A. Santavicca (Pennsylvania State University, U.S.A.)
- MS5-16  
16:15-16:25 **Simulation of Turbulent Premixed Flames with Flame-generated Turbulence and Counter-gradient Diffusion**  
Tatsuya Hasegawa, Kenichi Kawauchi, Kazuhiro Ouryouji (Nagoya University, Japan) and Shinnosuke Nishiki (Nagaoka University of Technology, Japan)

MS5-17            **Turbulent Burning Velocity of Methane/Air Turbulent Premixed Flames in a High-Pressure and High-Temperature Environment**  
16:25-16:35       Hideaki Kobayashi (Tohoku University, Japan), Katsuhiro Seyama (Koube Steel Ltd., Japan), Hirokazu Hagiwara and Yasuhiro Ogami (Tohoku University, Japan)

16:35-16:50       Break

Chairs: Hideaki. Kobayashi (Tohoku University, Japan) and Hyun Dong Shin (Korea Advanced Institute of Science and Technology (KAIST), Korea)

16:50-18:00       **Poster Session** (All Papers)

## **Room 7            MS6 Smart Material, Structural and Fluid Systems**

November 12, 2004

[Functional Fluids and Materials] Chair: Chang Shu (National University of Singapore, Singapore)

MS6-1            **Design of MR Devices Based on Typical Characteristics of MR Fluids**  
10:20-10:40       Toshihiko Shiraishi, Yosuke Sato and Shin Morishita (Yokohama National University, Japan)

MS6-2            **Detection of Contact Position for Smart Inflatable Tube**  
10:40-11:00       Michimasa Ono and Masayuki Okugawa (Gifu National College of Technology, Japan)

MS6-3            **Fabrication and Evaluation of Tactile Stimulator Array Using Stacked PZT Actuator**  
11:00-11:20       Tae-Kyu Kwon, Myoung-Jong Yoon, Nam-Gyun Kim and Kee-Ho Yu (Chonbuk National University, Korea)

MS6-4            **Modeling of Elastic Nonlinearities in Ferroelectric Materials: Example of PMN-PT and PZN-PT Single Crystals**  
11:20-11:40       Gaël Sebald, Laurent Lebrun, Daniel Guyomar (INSA Lyon, France)

MS6-5            **Nonlinear Stiffness of Magnetorheological Dampers**  
11:40-12:00       Dalei Guo (Chinese Academy of Sciences, China)

12:00-13:30       Lunch

[Sensor Applications]    Chair: Jae-Hung Han (Korea Advanced Institute of Science and Technology (KAIST), Korea)

MS6-6            **A Structural Health Monitoring System with Application to Welded Structures**  
13:30-13:50       Myung Hyun Kim, Sung Won Kang, Chung-Yon Keum, (Pusan National University, Korea) and Sung Soo Na (Korea University, Korea)

- MS6-7                    **PVDF Polymer Sensor System for Reading Braille**  
13:50-14:10        Mami Tanaka, Kaoru Miyata (Tohoku University, Japan), Tatsuo Nishizawa (Shinanokenshi Co., Ltd., Japan) and Seiji Chonan (Tohoku University, Japan)
- MS6-8                    **Development of a Sensor System for Measuring Tactile Sensation**  
14:10-14:30        Mami Tanaka, Yoshihiro Tanaka and Seiji Chonan (Tohoku University, Japan)
- MS6-9                    **Active Tactile Sensation for Monitoring Skin Conditions**  
14:30-14:50        Mami Tanaka, Hiroyasu Sugiura and Seiji Chonan (Tohoku University, Japan)
- MS6-10                  **A Stable Technique for Identifying Impact Forces on CFRP Laminates**  
14:50-15:10        Ning Hu and Hisao Fukunaga (Tohoku University, Japan)
- 15:10-15:30        Break
- [Actuator Applications]    Chair: Itsuro Kajiwara (Tokyo Institute of Technology, Japan)
- MS6-11                  **Multidisciplinary Design of Actuator Array and Adaptive Control System for Smart Structures**  
15:30-15:50        Itsuro Kajiwara and Ryo Tsuchiya (Tokyo Institute of Technology, Japan)
- MS6-12                  **Vibration Control of a Plate Using a Self-sensing Piezoelectric Actuator**  
15:50-16:10        Jinhao Qiu and Masakazu Haraguchi (Tohoku University, Japan)
- MS6-13                  **Free Vibration Analysis of Plates Using Least Square-based Finite Difference Method**  
16:10-16:30        C. Shu, W. X. Wu, H. Ding and C. M. Wang (National University of Singapore, Singapore)
- MS6-14                  **Robust Estimation Methodology for Control of Advanced Aircraft Wings**  
16:30-16:50        Sungsoo Na (Korea University, Korea), Myung Hyun Kim (Pusan National University, Korea), Sung-Nam Rim (Korea University, Korea) and Liviu Librescu (VA Tech, U.S.A.)
- MS6-15                  **Active Vibration Control Using Self-sensing Actuator**  
16:50-17:10        Jae-Hung Han, Lae-Hyong Kang (Korea Advanced Institute of Science and Technology (KAIST), Korea), Young-Hwan Chang (Hyundai & Kia Motors Corp., Korea) and Do-Hyung Kim (KARI, Korea)

**Room 6**

**MS7 Advanced Fluid Information for Controlling Flows**

November 11, 2004

Chair: Hiroshi Higuchi (Syracuse University, U.S.A.)

MS7-1                   **Minimal Time and Space Information for Turbulent Flow Control** (Invited)  
10:10-11:10       Jean-Paul Bonnet, Laurent Perret and Joel Delville (University of Poitiers, France)

MS7-2                   **A Low Dimensional Method for Closed-Loop Feedback Control of the Turbulent Flow over a Wing**  
11:10-11:40       Julie Ausseur, Jeremy Pinier, Mark Glauser and Hiroshi Higuchi (Syracuse University, U.S.A.)

11:40-13:00       Lunch

Chair: Toshiyuki Hayase (Tohoku University, Japan)

MS7-3                   **Smart Control of Flow Separation on an Airfoil**  
14:00-14:30       Akira Nishizawa (Japan Aerospace Exploration Agency (JAXA), Japan), Yasushi Hashimoto (International Christian University, Japan), Shohei Takagi (Japan Aerospace Exploration Agency (JAXA), Japan) and Hiro Yoshida (National Institute of Advanced Industrial Science & Technology, Japan)

MS7-4                   **Feedback Control of Near-Wall Reynolds Shear Stress in Wall-Turbulence**  
14:30-15:00       Koji Fukagata and Nobuhide Kasagi (The University of Tokyo, Japan)

MS7-5                   **Aerodynamic Cavity Noise Reduction by Passive Control**  
15:00-15:30       Seiichiro Izawa, Hiroshi Maita, Takahiro Watanabe, Ao-Kui Xiong and Yu Fukunishi (Tohoku University, Japan)

15:30-15:50       Break

Chair: Jean-Paul Bonnet (University of Poitiers, France)

MS7-6                   **Numerical Realization of Flow with Karman Vortex Street behind a Square Cylinder**  
15:50-16:20       Toshiyuki Hayase and Hikaru Shibata (Tohoku University, Japan)

MS7-7                   **Control of Three-Dimensional Wake of Bluff Body**  
16:20-16:50       Hiroshi Higuchi (Syracuse University, U.S.A.)

MS7-8                    **Active Instability Control of Thermoacoustic Oscillation in Premixed Gas Turbine Combustors**

16:50-17:20

Hiroyuki Sato (Aoyama Gakuin University, Japan), Masaru Ikame, Kazuyoshi Harumi, Takeyuki Kishi, Katsuhide Hiraoka, Hideyuki Oka (National Maritime Research Institute, Japan), A. Koichi Hayashi (Aoyama Gakuin University, Japan) and Satoru Ogawa (Japan Aerospace Exploration Agency (JAXA), Japan)

MS7-9                    **Control of Cavitating Flows: A Perspective**

17:20-17:50

Roger E. A. Arndt, Gary J. Balas and Martin Wosnik (University of Minnesota, U.S.A.)

Chairs: Hiroshi Higuchi (Syracuse University, U.S.A.) and Toshiyuki Hayase (Tohoku University, Japan)

17:50-18:20

Open Discussion and Closing