

PROGRAM

8th Congress in Japan

IGTC'03 Tokyo

International Gas Turbine Congress 2003 Tokyo

November 2-7, 2003



IGTC
'03
Tokyo

Sponsorship

The Iwatani Naoji Foundation



THE JAPAN GAS ASSOCIATION

Naito Taisyun Science and Technology Foundation



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INTERNATIONAL GAS TURBINE CONGRESS 2003 TOKYO

NOVEMBER 2-7,2003

■ SPONSORING SOCIETY

Gas Turbine Society of Japan (GTSJ)

■ COLLABORATING SOCIETIES

- The American Society of Mechanical Engineers (ASME-IGTI)
- The Chinese Society of Engineering Thermophysics (CSET)
- International Centre for Heat and Mass Transfer (ICHMT)
- The Institute of Mechanical Engineers (IMechE)
- The Japan Society for Aeronautics and Space Sciences (JSASS)
- The Japan Society of Mechanical Engineers (JSME)
- The Korean Fluid Machinery Association (KFMA)
- The Korean Society of Mechanical Engineers (KSME)
- Société Française des Mécaniciens (S.F.M.)
- Société Française des Thermiciens (S.F.T.)
- Verein Deutscher Ingenieure (VDI-GET)

■ COOPERATIVE SOCIETIES

- The Ceramic Society of Japan (CSJ)
- Combustion Society of Japan (CSJ)
- Engineering Research Association for Supersonic Transport Propulsion System (ESPR)
- The Federation of Electric Power Companies (FEPC)
- The Heat Transfer Society of Japan (HTSJ)
- Japanese Aero Engines Corporation (JAEC)
- Japan Cogeneration Center (JCGC)
- The Japan Electrical Manufacturers' Association (JEMA)
- Japan Fine Ceramics Association (JFCA)
- The Japan Institute of Energy (JIE)
- The Japan Institute of Marine Engineering (JIME)
- Japan Internal Combustion Engine Federation (JICEF)
- Japan Society of Energy and Resources (JSER)
- Japan Society for the Promotion of Machine Industry (JSPMI)
- Land Engine Manufacturers Association (LEMA)
- Society of Automotive Engineers of Japan (SAEJ)
- The Society of Japanese Aerospace Companies (SJAC)

- Thermal and Nuclear Power Engineering Society (TENPES)
- Turbomachinery Society of Japan (TSJ)
- The Visualization Society of Japan (VSJ)

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Dr. David C. Wisler(USA)
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- The Iwatani Naoji Foundation
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- Suzuki Foundation



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MESSAGE
FROM
THE IGTC'03 TOKYO CHAIRS



It is our pleasure to announce the opening of the International Gas Turbine Congress 2003 Tokyo, which is the 8th Congress, held in Japan concerning gas turbine and turbo supercharger technologies.

On behalf of the organizing Committee and the Executive Committee of IGTC'03 Tokyo, we would like to express our gratitude to the participants from both abroad and Japan, and to the collaborating and the cooperative societies for their kind contribution as well as to the foundations and the corporate members of our society for their financial support to ensure a successful Congress.

In the technical program, 7 Keynote Speeches will be presented by 7 of the world's leading experts. 14 technical papers on the latest topics will be presented in 4 Organized Sessions and 146 technical papers will be presented in 42 Technical Sessions in various fields of gas turbine technologies. The technical program will be rounded off by the Panel Discussion on "Gas Turbines in the Future".

We are confident that this Congress will provide a meaningful opportunity for all participants to exchange recent information on gas turbine technologies through active discussion in the Technical Sessions. The Exhibition to be held in conjunction with the Congress should also prove interesting and useful.

We hope that participants will take the opportunity of this Congress to contribute to the future development of gas turbine technologies.

Mototsugu Ito

Chairman

The Organizing Committee of
IGTC'03 Tokyo

Osamu Kawaguchi

Chairman

The Executive Committee of
IGTC'03 Tokyo

1. SCHEDULE OF THE CONGRESS

Welcome Reception:	Nov. 2 (Sun)
Technical Sessions:	Nov. 3 (Mon) - 6 (Thu)
Banquet:	Nov. 5 (Wed)
Plant Tours:	Nov. 7 (Fri)

Nov. 2 (Sun)	Morning	Afternoon	Evening
		Registration (2F): 16:00-18:00 Welcome Reception (5F): 17:00-19:00	
Nov. 3 (Mon)	Morning	Afternoon	Evening
	Registration (2F) 9:00-17:00		
	Exhibition (1F) 10:00-17:00		
	Open Lecture		
		Tea Ceremony Lesson (4F) 12:00-17:00	
	Opening Address (Main Hall) 9:30-9:40	Technical Sessions (6 rooms) 13:20-14:50	
	Keynote Speech 1&2 (Main Hall) 9:40-11:50	Forum1 (Main Hall) 15:10-16:40	
		Technical Sessions (6 rooms) 17:00-19:00	
Nov. 4 (Tue)	Morning	Afternoon	Evening
	Registration (2F) 9:00-17:00		
	Exhibition (1F) 9:00-17:00		
	Tea Ceremony Lesson (4F) 11:00-16:00		
	Technical Sessions (6 rooms) 9:00-11:00	Keynote Speech4 (Main Hall) 13:40-14:30	
	Keynote Speech 3 (Main Hall) 11:10-12:10	Technical Sessions (6 rooms) 14:50-16:50	
		Forum2 (Main Hall) 17:00-19:00	
Nov. 5 (Wed)	Morning	Afternoon	Evening
	Registration (2F) 9:00-17:00		
	Exhibition (1F) 9:00-17:00		
	Tea Service (Green Tea) (4F) at any time		
	Technical Sessions (6 rooms) 9:00-11:30	Technical Sessions (6 rooms) 14:10-15:40	
	Keynote Speech5 (Main Hall) 11:40-12:40	Keynote Speech6 (Main Hall) 15:50-16:50	
			Tour of the Aquarium & Banquet (Tokyo Sea Life Park) 17:30-20:30
Nov. 6 (Thu)	Morning	Afternoon	Evening
	Registration (2F) 9:00-17:00		
	Exhibition (1F) 9:00-17:00		
	Tea Service (Green Tea) (4F) at any time		
	Technical Sessions (6 rooms) 9:00-11:00	Technical Sessions (6 rooms) 13:30-15:00	
	Keynote Speech7 (Main Hall) 11:10-12:10	Panel Discussion (Main Hall) 15:20-17:50	
		Closing (Main Hall) 17:50-18:00	
Nov. 7 (Fri)	Morning	Afternoon	Evening
	Optional Plant Tours		

Note: The front gate of the congress site is open at 8:30 every morning.

Nov. 3 (Mon) is a national holiday of Japan

2. MAP AND ROOM LOCATIONS OF CONGRESS SITE

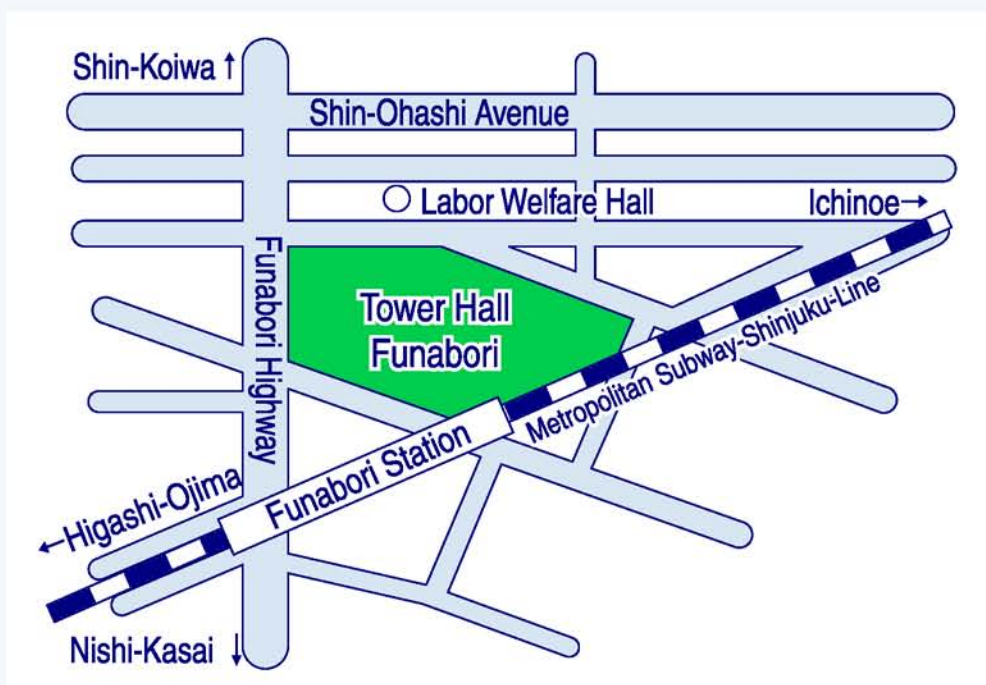
Tower Hall Funabori (Edogawa-ku Sohgo Kumin Hall)

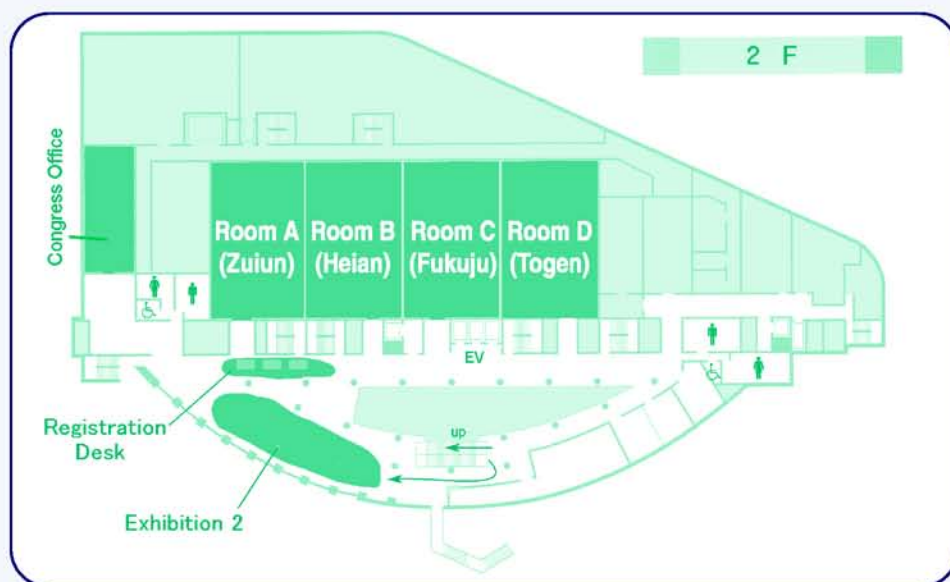
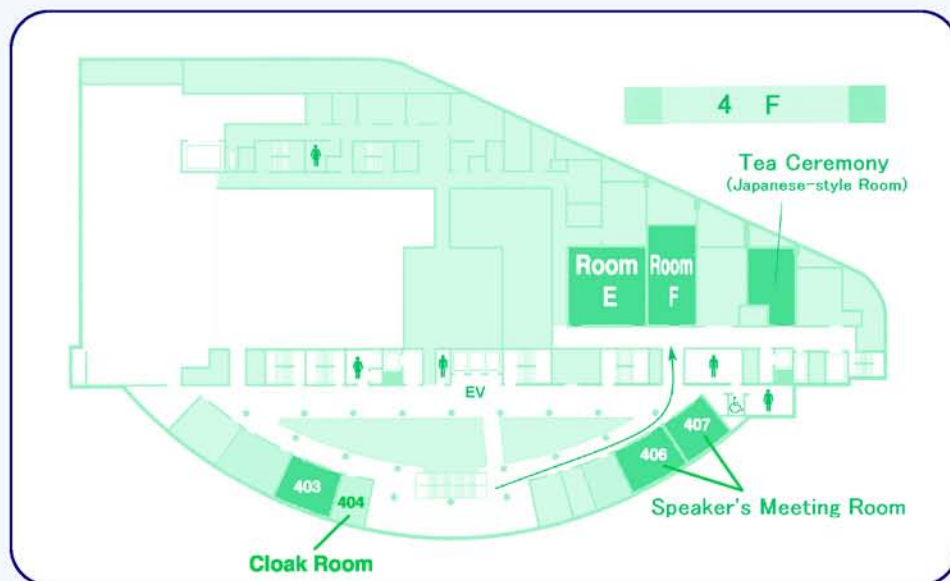
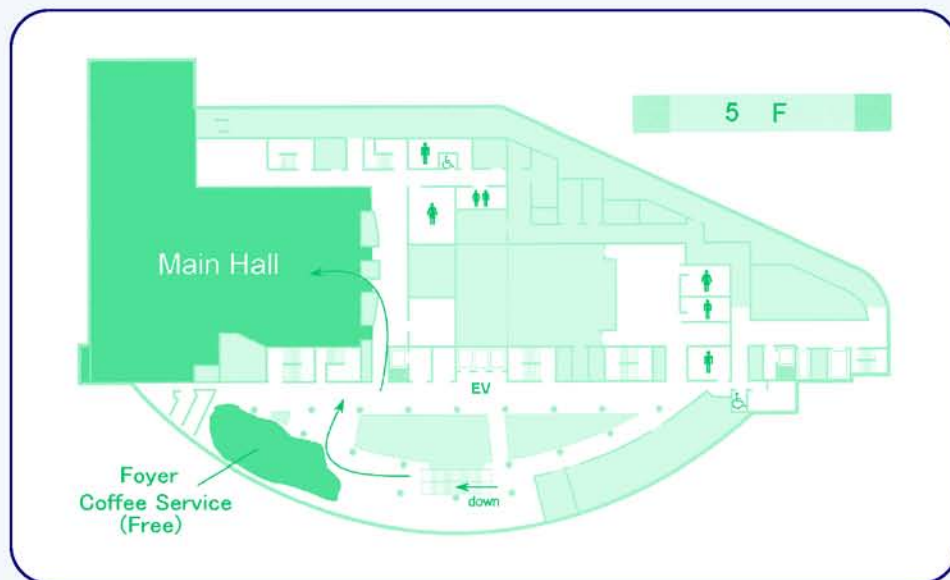
4-1-1 Funabori, Edogawa-ku, Tokyo 134-0091, Japan

TEL: +81-3-5676-2211



Courtesy of Tower Hall Funabori





3. PLENARY SESSIONS

3.1 Keynote Speech

Main Hall

November 3 (Mon)

Keynote Speech-1: 9:40-10:40

Micro- or Small- Gas Turbines

Prof. Terry Simon (University of Minnesota, USA)

Chairperson: *Dr. Kenichirou Takeishi*

Keynote Speech-2: 10:50-11:50

High Temperature Materials for Gas Turbines:
The Present and Future

Dr. Hiroshi Harada (National Institute of Materials Science, Japan)

Chairperson: *Mr. Yomei Yoshioka*

November 4 (Tue)

Keynote Speech-3: 11:10-12:10

Fuel Cell and Gas Turbine for Future Energy
System

Dr. Takao Watanabe (Central Research Institute of Electric Power Industry, Japan)

Chairperson: *Mr. Katsuhide Hiraoka*

Keynote Speech-4: 13:40-14:30

Future View of Energy Supply and Role of Gas
Turbine in Japan

Mr. Hiroyuki Ino (Tokyo Electric Power Company, Japan)

Chairperson: *Prof. Osamu Kawaguchi*

November 5 (Wed)

Keynote Speech-5: 11:40-12:40

Combustion Technology for Current and Future
Gas Turbines

Prof. Ann Dowling (University of Cambridge, UK)

Chairperson: *Mr. Yasuhiro Kinoshita*

Keynote Speech-6: 15:50-16:50

Recent Findings of Analytical Studies in
Unsteady Aerodynamics, Aeroacoustics and
Aeroelasticity of Turbomachines

Prof. Masanobu Namba (Sojo University, Japan)

Chairperson: *Prof. Toshinori Watanabe*

November 6 (Thu)

Keynote Speech-7: 11:10-12:10

Aeroengine Technology in 21st Century

Dr. Mike Benzakein (GE Aircraft Engines, USA)

Chairperson: *Dr. Yoshiya Nakamura*

3.2 Forum1

“Industry-University Cooperation in Gas Turbine Research”

Main Hall

November 3 (Mon) 15:10-16:40

Co-Chairs: *Dr. David Wisler, Prof. Toshinori Watanabe*

Panelists:

Dr. David Wisler (GE Aircraft Engines, USA)

Prof. Xiaofeng Sun (Beijing Institute of Aeronautics and Astronautics, China)

3.3 Forum2

“Current Status and Strategy of Electricity and Energy Supply”

Main Hall

November 4 (Tue) 17:00-19:00

Chairperson: *Mr. Keizo Tsukagoshi*

Panelists:

Prof. Li Yuhong (Tsinghua University, China)

Prof. Hyung Hee Cho (Yonsei University, Korea)

Mr. Prutichai Chonglertvanichkul (Electricity Generating Authority of Thailand, Thailand)

Mr. Alberto Dalla Rosa (Electric Power Development Co., Ltd., Japan)

Prof. Morihiro Kurushima (New Energy and Industrial Technology Development Organization, Japan)

3.4 Panel Discussion

“Gas Turbine in the Future”

Main Hall

November 6 (Thu) 15:20-17:50

Co-chairs:

Prof. Nobuhide Kasagi, Mr. Kimio Sakata

Panelists:

Dr. Mike Benzakein (GE Aircraft Engines, USA)

Prof. Terry Simon (University of Minnesota, USA)

Mr. Yoshiaki Tsukuda (Mitsubishi Heavy Industries, Ltd., Japan)

Mr. Shoichiro Inoue (Ministry of Land, Infrastructure and Transport, Japan)

Dr. Mikio Sato (Central Research Institute of Electric Power Industry, Japan)

4. SESSION PROGRAM

	Time	Room A	Room B	Room C	Room D	Room E	Room F
Nov.3 MON	9:30	Opening Address					
	9:40	Keynote Speech 1 (at Main Hall) "Micro- or Small- Gas Turbines" Prof. Terry Simon University of Minnesota Chairperson: Dr. Kenichiro Takeishi (Mitsubishi Heavy Industries,Ltd.)					
	10:40	Break					
	10:50	Keynote Speech 2 (at Main Hall) "High Temperature Materials for Gas Turbines: The Present and Future" Dr. Hiroshi Harada National Institute of Materials Science Chairperson: Mr. Yomei Yoshioka (Toshiba Corporation)					
	11:50	Lunch					
	13:20	Superalloy 1	Unsteady Flow & Noise 1	Aero engine 1	Cascade Design	Recuperator & Heat Exchanger	Forum Wave Rotor 1
	14:50	Break					
	15:10	Forum 1 (at Main Hall) "Industry-University Cooperation in Gas Turbine Research" Co-chairs: Dr. David Wisler (General Electric), Prof. Toshinori Watanabe (University of Tokyo)					
	16:40	Break					
	17:00	Superalloy 2	Turbine Flow Simulation	Aero engine 2	Combustion Control	Blade Structure	Forum Wave Rotor 2
Nov.4 TUE	19:00						
	9:00	Thermal Barrier Coating	Internal Flows 1	Heat Transfer & Flow Transition	Micro Gas Turbine	Throughflow Modeling	
	11:00	Break					
	11:10	Keynote Speech 3 (at Main Hall) "Fuel Cell and Gas Turbine for Future Energy System" Dr. Takao Watanabe Central Research Institute of Electric Power Industry Chairperson: Mr. Katsuhide Hiraoka (National Maritime Research Institute)					
	12:10	Lunch					
	13:40	Keynote Speech 4 (at Main Hall) "Future View of Energy Supply and Role of Gas Turbine in Japan " Mr. Hiroyuki Ino Tokyo Electric Power Company Chairperson: Prof. Osamu Kawaguchi (Keio University)					
	14:30	Break					
	14:50	OS Ultra Micro Gas Turbine 1	Internal Flows 2	Turbulence Model	Combustor Development	Advanced Material	Diagnostics, Control & Measurement 1
	16:50	Break					
	17:00	Forum 2 (at Main Hall) "Current Status and Strategy of Electricity and Energy Supply" Chairperson: Mr. Keizo Tsukagoshi (Mitsubishi Heavy Industries,Ltd.)					
Nov.5 WED	19:00						
	9:00	OS Ultra Micro Gas Turbine 2	Internal Flows 3	Ribbed Passage Flow & Heat Transfer	Low Emission Combustor	Rotor Dynamics & Bearing	Diagnostics, Control & Measurement 2
	11:30	Break					
	11:40	Keynote Speech 5 (at Main Hall) "Combustion Technology for Current and Future Gas Turbines" Prof. Ann Dowling University of Cambridge Chairperson: Mr. Yasuhiro Kinoshita (Kawasaki Heavy Industries, Ltd)					
	12:40	Lunch					
	14:10	OS Ultra Micro Gas Turbine 3	Development & Verification of CFD codes	Unsteady Flow & Noise 2	Conjugate Heat Transfer Analysis	Performance Analysis of Gas Turbines: Intake Air Humidifying & Filtration	
	15:40	Break					
	15:50	Keynote Speech 6 (at Main Hall) "Recent Findings of Analytical Studies in Unsteady Aerodynamics, Aeroacoustics and Aeroelasticity of Turbomachines" Prof. Masanobu Namba Sojo University Chairperson: Prof. Toshinori Watanabe (The University of Tokyo)					
	16:50						
	17:00	Shuttle Bus Service to Banquet(Tower Hall Funabori)					
Nov.6 THU	17:30	Tour of the Aquarium & Banquet(Tokyo Sea Life Park)					
	9:00	OS Marine Gas Turbines & Turbocharger	Surge/Stall 1	Industrial Gas Turbine & Power Plant 1	Impingement & Film Cooling	Combustor Design	Performance Analysis of Gas Turbines & New Systems
	11:00	Break					
	11:10	Keynote Speech 7 (at Main Hall) "Aeroengine Technology in 21st Century" Dr. Mike Benzakein GE Aircraft Engines Chairperson: Dr. Yoshiya Nakamura (Ishikawajima-Harima Heavy Industries Co.,Ltd.)					
	12:10	Lunch					
	13:30	Force/Vibration	Surge/Stall 2	Industrial Gas Turbine & Power Plant 2	Flows in Rotating or Bended Duct	Optimization & Inverse Method	Performance Analytic Modellings & Tool
	15:00	Break					
	15:20	Panel Discussion (at Main Hall) "Gas Turbines in the Future " Co-chairs: Prof. Nobuhide Kasagi (University of Tokyo) Mr. Kimio Sakata (Japan Aerospace Exploration Agency)					
	17:50	Closing Address					
	18:00						

Technical Sessions

November 3 Monday

13:20 - 14:50

Speaker's Name is underlined.

	Session A-1	Session B-1	Session C-1	Session D-1	Session E-1	Session F-1
	Superalloy 1	Unsteady Flow & Noise 1	Aero engine 1	Cascade Design	Recuperator & Heat Exchanger	Forum: Wave Rotor 1
	Chairpersons: Dr. Ryohei Tanaka (Japan Ultra-high Temperature Materials Research Institute) Mr. Takashi Sakurai (Ishikawajima-Harima Heavy Industries Co.,Ltd.)	Chairpersons: Prof. Satoru Yamamoto (Tohoku University) Dr. Yutaka Kawata (Mitsubishi Heavy Industries,Ltd.)	Chairpersons: Dr. Arun K. Sehra (NASA, USA) Dr. Seishi Uchida (Mitsubishi Heavy Industries,Ltd.)	Chairpersons: Prof. Jian-jun LIU (Chinese Academy of Sciences, P.R.China) Dr. Atsumasa Yamamoto (Japan Aerospace Exploration Agency)	Chairpersons: Mr. Yasuoki Tomita (Mitsubishi Heavy Industries,Ltd.)	Chairpersons: Prof. Toshio Nagashima (The University of Tokyo)
13:20	TS-120 <i>Recovery of Material Properties in Service-Degraded Gas Turbine Blades</i> <u>A. Ito</u> (Chubu Electric Power Co.,Ltd.), Y. Kagiya, H. Watanabe, H. Takagi, D. Saito, Y. Yoshioka, H. Ito, J. Ishii	TS-047 <i>Study on Noise Reduction in Turbofan (Effects on Performance and Noise by Improving Outlet Angle of Impeller)</i> <u>T. Hirano</u> (Hosei University), G. Minorikawa, S. Suzuki, S. Mizuki	TS-107 <i>MG5 series Commercial Helicopter Engine Development and Utilization</i> <u>S. Uchida</u> (Mitsubishi Heavy Industries, Ltd.), Y. Nagashima, K. Shimauchi	TS-041 <i>Novel Blade-free Turbomachine Concept for Microgasturbine Engine Applications (Part 1. Design.Design Characteristics. Metal Model Realization)</i> A. Soudarev (Boyko Research-Engineering "Ceramic Heat Engines" Center (NIZ KTD), Russia), A. Souryaninov, V. Tikhoplav, A. Molchanov, <u>P. Avran</u> , L. Lelait	TS-110 <i>Applications of Compact Size Recuperator on Vehicle Microturbines</i> <u>R. Cui</u> (Shenyang Liming Aero-Engine Group Corp., P.R.China), X. Wu, K. Wang, B. Deng	FR-301 <i>Preliminary Design Procedure for Gas Turbine Topping Reverse-Flow Wave Rotors</i> P. Akbari (Michigan State University, USA), <u>N. Müller</u>
13:50	TS-123 <i>Development and Evaluation of High Strength Ni-base Single Crystal Superalloy,TMS-82+</i> <u>T. Hino</u> (Toshiba Corporation), Y. Yoshioka, Y. Koizumi, T. Kobayashi H. Harada	TS-048 <i>Unsteady Three-Dimensional Navier-Stokes Simulations of Turbine Rotor-Stator Interaction Using Multi-Airfoil</i> <u>D. Biswas</u> (Toshiba Corporation), T. Takamatsu, H. Iwasaki	TS-104 <i>Overview on 4 Years Achievements of Research and Technology Development of Environmentally Compatible Propulsion System for Next- Generation Supersonic Transport (ESPR project)</i> <u>Y. Fujitsuna</u> (Engineering Research Association for Supersonic Transport Propulsion System)	TS-042 <i>Development Status of a Fore-Loaded Turbine Blade</i> <u>H. Taki</u> (Kawasaki Heavy Industries, Ltd.), D. Kataoka, H. Kato, K. Hashimoto	TS-067 <i>Development of CMC Heat Exchanger and Its Thermo-fluid Dynamics Performance</i> <u>T. Yoshida</u> (Japan Aerospace Exploration Agency), T. Kumagai, T. Yamane	FR-302 <i>Introductory Investigation of Micro Wave Rotor</i> <u>K. Okamoto</u> (The University of Tokyo), <u>T. Nagashima</u> , <u>K. Yamauchi</u>
14:20	TS-124 <i>Development of A Grain Defects Resistant Ni-Based Single Crystal Superalloy YH61</i> <u>H. Tamaki</u> (Hitachi, Ltd.), A. Okayama, A. Yoshinari, K. Kageyama, K. Sato, T. Ohno	TS-049 <i>Numerical and Experimental Investigation of the Unsteady Flow Field in a Transonic Centrifugal Compressor</i> <u>H. Krain</u> (DLR, Germany), C. Hah	TS-105 <i>Technology Requirements for Revolutionary Propulsion Systems of the 21st Century</i> W. Whitlow, Jr. (NASA Glenn Research Center, USA), J. M. Earls, V. W. Wessel	TS-043 <i>CFD Design of a 8:1 Pressure Ratio Centrifugal Compressor</i> V. I. Milesin (Central Institute of Aviation Motors, Russia), <u>A. N. Startsev</u> , I. K. Orekhov	TS-112 <i>Development of Large Scale Recuperator for Gas Turbine</i> R. Akiyoshi (Ishikawajima-Harima Heavy Industries Co.,Ltd.), K. Imai, T. Sioda, K. Ito, M. Hori	FR-303 <i>Internal Combustion Wave Rotors for Gas Turbine Engine Enhancement</i> <u>R. Nalim</u> (Indiana University Purdue University Indianapolis (IUPUI), USA), K. Pekkan

November 3 Monday

17:00 - 19:00

	Session A-2	Session B-2	Session C-2	Session D-2	Session E-2	Forum 3
	Superalloy 2	Turbine Flow Simulation	Aero engine 2	Combustion Control	Blade Structure	Forum: Wave Rotor 2
	Chairpersons: Mr. Koji Take (Kawasaki Heavy Industries, Ltd)	Chairpersons: Prof. Hyung Hee Cho (Yonsei University, Korea)	Chairpersons: Dr. Jih-Fen Lei (NASA Glenn Research Center, USA) Dr. Yoshiya Nakamura (Ishikawajima-Harima Heavy Industries Co.,Ltd.)	Chairpersons: Dr. Kazuo Suzuki (Japan Aerospace Exploration Agency) Mr. Yasuhiro Kinoshita (Kawasaki Heavy Industries, Ltd)	Chairpersons: Dr. Stanislaw Strzelecki (Technical University of Lodz, Poland) Prof. Sigehiko Kaneko (The University of Tokyo)	Chairpersons: Prof. Toshio Nagashima (The University of Tokyo)
17:00	TS-121 <i>Development of the Third Generation Single Crystal Superalloy for Power Generation Gas Turbines</i> <u>A. Yoshinari</u> (Hitachi Ltd.), R. Hashizume, Y. Murata, M. Morinaga	TS-070 <i>Turbulent Flow Computation in Film-Cooling Turbine Cascades</i> <u>B. Kurmanov</u> (ALSTOM Power Uniturbo, Russia), M. Namba, G. Podvizd	TS-106 <i>Revolutionary Propulsion Systems for 21st Century Aviation</i> <u>A. K. Sehra</u> (NASA Glenn Research Center, USA), J. Shin	TS-146 <i>Application of the Helmholtz Resonator for Reducing the Combustion Oscillation in a Gas Turbine</i> <u>S. Yamanaka</u> (Toshiba Corporation), F. Maeda, K. Shioda, K. Iwabuchi, T. Tsuchiya, M. Okamoto	TS-009 <i>Bird Impact Analysis of Pre-Stressed Fan Blades Using Explicit Finite Element Code</i> <u>R. Jain</u> (Gas Turbine Research Establishment, India), K. Ramachandra	FR-304 <i>Oral Presentation Only</i> <i>The Wave Rotor for Gas Turbines: Description, Operation and Use</i> Y. Ribaud (ONERA, France)
17:30	TS-118 <i>Mechanical Properties and Castability of 4th Generation Ni-base Single Crystal Superalloy TMS-138</i> <u>Y. Aoki</u> (Ishikawajima-Harima Heavy Industries Co., Ltd.), M. Arai, K. Chikugo, Y. Koizumi, H. Harada	TS-071 <i>Approach to a New Scheme Film Cooling Enhancement by Jet Path Control and Reduction Mixing zones Using Coupled Jets</i> A. Javadi (Sharif University of Technology, Iran), K. Javadi, M. Taeibi-Rahni, M. Darbandi	TS-108 <i>Design and Test of Transonic Compressor Rotor with Tandem Cascade</i> <u>Y. Sakai</u> (Kawasaki Heavy Industries, LTD), A. Matsuoka, S. Suga, K. Hashimoto	TS-147 <i>Advanced Monitoring System For Combustor Pressure Fluctuation</i> <u>H. Iba</u> (Mitsubishi Heavy Industries, LTD.), M. Nomura, T. Kawakami, T. Koga	TS-010 <i>Reduction of Vibratory Stress of Compressor Blade by Use of Asymmetric Vane Spacing</i> <u>Y. Kaneko</u> (Mitsubishi Heavy Industries, Ltd.), K. Mori, H. Okui	FR-305 <i>Oral Presentation Only</i> <i>Autonomous Pressure Wave Compressor Devise</i> J. Piechna (Warsaw Technical University, Poland)
18:00	TS-119 <i>Development of a Next Generation Ni-base Single Crystal Superalloy</i> <u>Y. Koizumi</u> (National Institute for Materials Science (NIMS)), T. Kobayashi, Z. Jianxin, T. Yokokawa, H. Harada, Y. Aoki, M. Arai	TS-072 <i>A Three-Dimensional Navier-Stokes Simulation of A Film-Cooled Turbine Stage</i> <u>T. Nishizawa</u> (Japan Aerospace Exploration Agency), K. Saiki, O. Nozaki, K. Kikuchi	TS-109 <i>A Booster Stage with Tandem Cascade Rotor for Fan Engine</i> S. Suga (Kawasaki Heavy Industries, Ltd.), A. Matsuoka, Y. Sakai, K. Hashimoto	TS-148 <i>Sound Emission from Laminar Diffusion Flame with Controlled Oscillatory Fuel Flow</i> <u>K. Harumi</u> (National Maritime Research Institute), M. Ikame, T. Kishi, K. Hiraoka, H. Oka	TS-011 <i>Blade-Strength Assessment of a Marine Turbocharger under Development</i> <u>F. Iwaki</u> (Ishikawajima-Harima Industries Co., Ltd.), K. Mitsubori, H. Taguchi, M. Obata, A. R. Mech	FR-306 <i>Oral Presentation Only</i> <i>The General Compatibility Conditions of the Nonstationary Compressible Flow in Stationary Periodic and Materially Balanced Pressure Wave Machine</i> H. A. Nour Eldin (University of Wuppertal, Germany)
18:30	TS-122 <i>Development of a Gas Turbine Design Program Coupled with an Alloy Design Program - A Virtual Turbine</i> <u>H. Saeki</u> (Toshiba Corporation), T. Yokokawa, H. Harada, Y. Fukuyama, T. Yoshida	TS-073 <i>Numerical Investigation of the Flow Field in HP Turbine Stage</i> <u>F. Martelli</u> (University of Florence, Italy), P. Adami, E. Belardini		TS-132 <i>LES of Combustion Instabilities in a Lean Premixed Gas Turbine Combustor</i> <u>J. Shinjo</u> (Japan Aerospace Exploration Agency), Y. Mizobuchi, S. Ogawa	TS-012 <i>Interface Construction for Thermal Stress Analysis in Virtual Turbine and Its Application</i> <u>J. Chen</u> (Japan Aerospace Exploration Agency), A. Ogawa, R. Hashimoto, T. Yoshida	FR-307 <i>Oral Presentation Only</i> <i>Wave Rotor - A Review of the Work of Power Jets Ltd. and Univ. of Calgary</i> J. A. C. Kentfield (University of Calgary, Canada)