ASME 2013 GAS TURBINE INDIA CONFERENCE

Presented by The ASME International Gas Turbine Institute and CSIR-National Aerospace Laboratories

FINAL PROGRAM

December 5–6, 2013 CSIR-National Aerospace Laboratories | Bangalore, Karnataka, India

ASME 2013 GT INDIA



From the Conference Chair

ASME 2013 Gas Turbine India Conference Attendees,

On behalf of the ASME International Gas Turbine Institute and CSIR-National Aerospace Laboratories (CSIR-NAL), I would like to welcome you to the ASME 2013 Gas Turbine India Conference. As before, the primary focus of this conference is to bring together those from across India who are working in industry, academia, and government, as they hear and discuss the latest developments in gas turbine technology. Our endeavor has been to provide a platform to share great ideas from within India and other countries in Asia. We welcome participation from around the world and expect the annual GT India Conference to become known as a complement to the annual ASME Turbo Expo conference. Bangalore is now well known internationally for its IT Industries. It is also the aerospace capital of India and hosts several Indian aeronautics and space education, research, design, development and manufacturing organizations. It is home to design and development centers of several multinational businesses engaged in gas turbine and allied technologies. As all these organizations and activities are well-represented in this conference, I expect your participation will prove to be a most rewarding experience.

There are eight tracks this year: Compressors, Turbines, Combustion, Fuels & Emissions, Heat Transfer, Structures & Dynamics, Controls, Diagnostics & Instrumentation, Renewable Energy, and Materials & Manufacturing. Over 100 technical papers that have been subjected to careful review by a broad range of experts worldwide will be presented. Panel presentations will provide summaries of accomplishments and thoughts to engage us for the future. We hope the scheduling will facilitate the best networking opportunities for all participants from industry, academia, and government. Further, I hope that the CSIR-NAL venue will provide the right ambience for this conference.

Finally, on behalf of the ASME International Gas Turbine Institute and CSIR-NAL, we thank all who have supported the GT India conference through generous sponsorship. This event would not be possible without the hundreds of hours spent by the volunteers who served as reviewers, session organizers, and vanguard chairs, coordinated by Prof. Joseph Mathew, Review Chair and Mr. Subhrajit Dey, Technical Program Chair. Our sincere thanks to Dr. Geoff Sheard, Review Chair, ASME, and Mr. Joseph Machnaim, Conference Chair, GT India 2012 for their support and guidance. Finally, much appreciation goes to the ASME staff who pulled everything together in a seamless way. Thank you for attending.



Dr. M. Jayaraman Conference Chair ASME Gas Turbine India Conference 2013



Welcome to Bangalore



Bangalore | India

Welcome to the 2nd annual ASME Gas Turbine India Conference, presented by CSIR-National Aerospace Laboratories (CSIR-NAL).



- Aerodynamics
- · Applied CFD & Heat Transfer
- · Blade Cooling
- Multi-disciplinary Optimization
- Rotordynamics
- Structures & Dynamics



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- 5 SCHEDULE AT A GLANCE
- 6 KEYNOTE SESSION
- 8 FACILITY TOUR
- 8 CHAPTER MEETING
- 8 VANGUARD CHAIRS
- **10** SESSIONS

ASME 2013 Gas Turbine India Conference

Address: CSIR-National Aerospace Laboratories HAL Airport Rd Bangalore, Karnataka 560017, India

Sponsors & Exhibitors



FEATURE DISPLAY

Presented by Gas Turbine Research Establishment and AneCom AeroTest

This test vehicle simulates the compressor module of an Indian aero-engine, and was previously used as a component test rig to validate the compressor's aerodynamic performance. See it ONLY at the ASME 2013 Gas Turbine India Conference Exhibit, from December 5 - 6, 2013.





Presented by ASME International Gas Turbine Institute

The Most Important Conference for Turbomachinery Professionals



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Schedule at a Glance

Thursday, December 5

Registration	8:00 AM - 5:00 PM
Keynote	9:00 – 10:00 AM
Exhibit Hall Open	10:00 AM - 2:00 PM
Break	10:00 – 10:30 AM
Panel Discussions/Morning Sessions	10:30 AM- 12:30 PM
Lunch	12:30 – 1:30 PM
Afternoon Sessions	1:30 – 3:30 PM
Break	3:30 - 4:00 PM
Facility Tour	4:00 - 6:00 PM
GT India Chapter Meeting & Banquet Dinner	6:30 PM
Friday December 6	
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Registration	8:00 AM – 5:00 PM
Registration Morning Session 1	8:00 AM – 5:00 PM 9:00- 10:30 AM
Registration Morning Session 1 Exhibit Hall Open	8:00 AM - 5:00 PM 9:00- 10:30 AM 10:00 AM - 3:00 PM
Registration Morning Session 1 Exhibit Hall Open Lecture Session	8:00 AM - 5:00 PM 9:00- 10:30 AM 10:00 AM - 3:00 PM 11:15 AM - 12:15 PM
Registration Morning Session 1 Exhibit Hall Open Lecture Session Break	8:00 AM - 5:00 PM 9:00- 10:30 AM 10:00 AM - 3:00 PM 11:15 AM - 12:15 PM 10:30 - 10:45 AM
Registration Morning Session 1 Exhibit Hall Open Lecture Session Break Morning Session 2	8:00 AM - 5:00 PM 9:00- 10:30 AM 10:00 AM - 3:00 PM 11:15 AM - 12:15 PM 10:30 - 10:45 AM 10:45 AM- 12:15 PM
Registration Morning Session 1 Exhibit Hall Open Lecture Session Break Morning Session 2 Lunch	8:00 AM - 5:00 PM 9:00- 10:30 AM 10:00 AM - 3:00 PM 11:15 AM - 12:15 PM 10:30 - 10:45 AM 10:45 AM- 12:15 PM 12:15 - 1:15 PM
RegistrationMorning Session 1Exhibit Hall OpenLecture SessionBreakMorning Session 2LunchAfternoon Session 1	8:00 AM - 5:00 PM 9:00- 10:30 AM 10:00 AM - 3:00 PM 11:15 AM - 12:15 PM 10:30 - 10:45 AM 10:45 AM- 12:15 PM 12:15 - 1:15 PM 1:15 - 2:45 PM
Registration Morning Session 1 Exhibit Hall Open Lecture Session Break Morning Session 2 Lunch Afternoon Session 1 Break	8:00 AM - 5:00 PM 9:00- 10:30 AM 10:00 AM - 3:00 PM 11:15 AM - 12:15 PM 10:30 - 10:45 AM 10:45 AM- 12:15 PM 12:15 - 1:15 PM 1:15 - 2:45 PM 2:45 - 3:00 PM
RegistrationMorning Session 1Exhibit Hall OpenLecture SessionBreakMorning Session 2LunchAfternoon Session 1BreakAfternoon Session 2	8:00 AM - 5:00 PM 9:00- 10:30 AM 10:00 AM - 3:00 PM 11:15 AM - 12:15 PM 10:30 - 10:45 AM 10:45 AM- 12:15 PM 12:15 - 1:15 PM 1:15 - 2:45 PM 2:45 - 3:00 PM 3:00 - 4:30 PM

Keynote Session

Concerns about the Effect of CO₂ Emissions on Climate Change and Rising Energy

Thursday, December 5th | 9:00 – 10:00 AM

Dr. K.V.L. Rao, Technical Advisor, ADA

The last three decades have ushered in a renaissance of several major Aeronautical and Aerospace programs in India. Design & development of Helicopters, Light Combat Aircraft, Transport Aircraft, Unmanned air vehicles, Intermediate Jet Trainer aircraft are some of the programs initiated during this period, which are now ready for entering into active service. These programs have enabled the establishment of core design & development technology along with the associated manufacturing, test & evaluation capabilities, including flight test capability.

While an initial batch of Gas turbines which power imported aircraft are imported along with aircraft, subsequent needs have been met with units manufactured in the country under Technology Transfer agreements, for the majority of acquisition over the last four decades. Now, this has been mandated as a requirement in the new Defence Procurement Policy along with Offset.

In parallel, indigenous gas turbine programs to design & develop a 80 KN augmented thrust turbofan (Kaveri) for combat aircraft, a 4 KN small gas turbine (PTAE-6) for UAV and a 110KW Jet fuel starter (JFS) was also initiated during this period as a modest beginning. All these programs have fully matured and have successfully completed the full design, development and flight test cycle. Both PTAE-6 & JFS have been integrated and are flying in service aircraft. Another indigenous 65 HP Wankel engine has been integrated to a UAV and is flying satisfactorily. Kaveri has matured to successfully complete the Flying Test Bed Trials.

Building on this success & establishment of core technology, the country is now poised to initiate full design & development programs for Advanced Medium Combat Aircraft, 20 ton cargo aircraft, advanced variants of Helicopters, Unmanned aircraft and a 100 pax Regional Transport Aircraft. To maximise the indigenous efforts on gas turbine design & production to power these new aircraft, several Technology Enabling Initiatives have been initiated as a joint Government, Industry and University partnership program under DRDO. The projects and programs under these activities initiated, progress achieved so far, and its linkages to various national programs proposed are highlighted in this paper.



Dr. Rao is the recipient of several awards which include Commonwealth scholarship, U.K. (1971-1974), Sir Roy Fedden Prize of Cranfield Instof Tech., U.K. (1974), ASME Gas Turbine –Best Paper Award (Jointly with Prof A H Lefebvre), USA (1982) & Chief of Airstaff –IAF- Commendation Medal (2009). He is a FELLOW of the Aeronautical Society of India.

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Facility Tour & Chapter Meeting

Facility Tour

NAL Campus | 4:00 - 6:00 PM

Pick up time is 3:50 pm on Thursday, December 5th in front of the SR Valluri auditorium. NAL will provide multiple buses.

Chapter Meeting

Matthan Hotel 6:30 PM

All conference attendees are welcome to attend the Gas Turbine India Chapter Meeting, where conference leadership will discuss current and future activities. Banquet Dinner to follow.

Conference Leadership Team

Conference Chair Dr. M. Jayaraman CSIR-National Aerospace Laboratories Bangalore, India

Conference Chair, ASME IGTI

Dr. Howard Hodson University of Cambridge Whittle Laboratory Cambridge, UK

Vanguard Chairs

Raghavan Rajendran National Aerospace Laboratories Bangalore, India

Ravikanth Avancha GE Aviation Bangalore, India

N. Muthuveerappan Gas Turbine Research Establishment Bangalore, India

Bhamidi Prasad IIT Madras Chennai, India Jay Ramachandran GE Aviation Bangalore, India

Chair

Subhrajit Dey

GE Global Research

Prof. Joseph Mathew Indian Institute of Science

Review Chair

Technical Program

Shyamsunder Mandayam GE Global Research Bangalore, India

Dhinagaran Ramachandran LM Wind Power India Bangalore, India

Sridhar M.K. National Aerospace Laboratories Bangalore, India

Dr. Geoff Sheard Flakt-Woods Group

Review Chair,

ASME IGTI

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Sessions

Thursday, December 5

Panel Discussion: The Next Generation of Narrow Body Aircraft 10:30 AM – 12:30 PM | Room: FMCD

Session Chair: Aspi Wadia, GE Aviation, Cincinnnati, OH, USA Session Co-Chair: B.N. Raghunandan, Indian Institute of Science, Bangalore, India

Panelists: Eric Maruy, *Airbus*, Gopalakrishna Kamath, *Bombardier Inc.*, Domala Uma Maheshwar, *GE Aviation*, Klaus-Peter Rued, *MTU Aero Engines AG*, Bernard Robic, *SNECMA*

More than 5000 single-aisle narrow body aircraft have already been ordered by airlines around the world. The overall objective of this panel is to discuss and provide general information on the airframes and engines being developed as we gear-up for the future. Airbus, COMAC, Bombardier, Boeing, and Mitsubishi, to name a few, are developing new airframe models, while GE, Pratt & Whitney Aircraft, SNECMA, and MTU are in the midst of engine development and certification for these aircraft.

Panel Discussion: Gas Turbine Materials Research & Development in India 10:30 AM – 12:30 PM | Room: TECHNOLOGY BLOCK 2

Session Chair: Sanjay Sondhi, GE Global Research, Bangalore, India

Panelists: Ashok Gogia, *Defence Metallurgical Research Lab*, Sundararaman Mahadevan, *University of Hyderabad*, Anand Krishnamurthy, *GE Power & Water*, M. Narayana Rao, *Mishra Dhatu Nigam Ltd*.

This panel will focus on materials research and development towards application in gas turbines. The talk will encompass vision, current status, and challenges.

ASME 2014 Gas Turbine India Conference

The third annual ASME Gas Turbine India Conference will be held in **New Delhi** next December. Be sure to mark your calendars to attend the next edition of this exciting conference!



December 5, 2013

10:30

11:00

Room ACD

COMPRESSORS

Compressor Flow Studies III

Session Chair: Kulaveeran Murugesan, CSIR-National Aerospace Laboratories, Bangalore, India Session Co-Chair: Chaitanya Ongole, GE Aviation, Bangalore, India

TECHNOLOGY BLOCK 1

HEAT TRANSFER

General GT Heat Transfer II

Session Chair: Sanjeev Jain, GE Power & Water, Bangalore, India Session Co-Chair: N Kulasekharan,

Saveetha Engineering College, Chennai, India

Unsteady Secondary Flow in an Annular Compressor Cascade GTINDIA2013-3560 Georg Hermle, Martin Lawerenz, University of Kassel

CFD Simulation of Open-Cell Aluminum Metal Foams for Pressure Drop Characterization GTINDIA2013-3605

Abhay G K, Jayakumar J S, Amrita Vishwa Vidyapeetham, Giridhara Babu Yepuri, Felix J., *CSIR-National Aerospace Laboratories*

Numerical Investigation of the Effect of Moving Endwall and Tip Clearance on the Losses in a Low Speed Axial Flow Compressor Cascade GTINDIA2013-3596 Mahesh K. Varpe, A.M. Pradeep, Indian Institute of Technology Bombay

Inverse Heat Transfer Analysis Of Porous Extended Surface Using Simplex Search Method

GTINDIA2013-3548 Rohit Kumar Singla, Ranjan Das, Arka Bhowmik, Ramjee Repaka, *Indian Institute of Technology Ropar*

 Numerical Studies on Effect of Stepped Tip Clearance Height on the Performance of Single Stage

 11:30
 Transonic Axial Flow Compressor GTINDIA2013-3722 Pritam Batabyal, Dilip B. Alone, CSIR-National Aerospace Laboratories, Sarat Kumar Maharana, Acharya Institute of Technology

12:30 - 1:30 PM

11

Lunch

Room KTMD

STRUCTURES & DYNAMICS

Bearings & Seals

Session Chair: Soumendu Jana, CSIR-National Aerospace Laboratories, Bangalore, India Session Co-Chair: Jay Ramachandran, GE Aviation, Bangalore, India

Room CSSD

CONTROLS, DIAGNOSTICS & INSTRUMENTATION

Monitoring & Diagnostics I

Session Chair: Amitava Datta, Jadavpur University, Kolkata, India

Metal Temperature Correlations in Tilting Pad Journal Bearings GTINDIA2013-3547 Manish Thorat, Brian Pettinato, Elliott Group, Pranabesh Dechoudhury, Pran RDA Consulting Inc.

Thermal Based Optimum Design of Tapered Roller Bearing Through Evolutionary Algorithm

11:00 GTINDIA2013-3792 Rajiv Tiwari, Rahul Chandran, Indian Institute of Technology Guwahati

Troubleshooting of Vibration Problems in Gas Turbines with Proximity and Seismic Probes GTINDIA2013-3569 Pankaj Kumar Sharma, Padmanabhan Gopalakrishnan, *GE India Industrial Pvt Ltd*

Flutter and Forced Vibration Characteristics of a Turbo Fan Bladed Disk Rotor

GTINDIA2013-3574 Madhavan Srinivasan, Sankar Kumar Jeyaraman, Rajeev Jain, *Gas Turbine Research Establishment*, Sujatha Chandramohan, AnandaRao Seshadri

Sekhar, Indian Institute of Technology Madras

Development of Foil Bearings for
Small Rotors
GTINDIA2013-364411:30Sadanand Kulkarni, Soniya Naik, Sarosh
Kumar K, Radhakrishna M, Soumendu
Jana, CSIR-National Aerospace Labora-
tories

12:30 - 1:30PM

10:30

Lunch

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December 5	5, 2013 Room ACD	Room FMCD	IECHNOLOGY BLOCK 2
	COMPRESSORS	TURBINES	COMBUSTION, FUELS & EMISSIONS
	Compressor Flow Studies I	Modeling, Simulation & Experiments	Combustion & Combustion Instability
	Session Chair: Kulaveeran Murug- esan, CSIR-National Aerospace Labora- tories, Bangalore, India Session Co-Chair: Chaitanya Ongole, GE Aviation, Bangalore, India	Session Chair: Ramesh O.N., Indian Institute of Science, Bangalore, India	Session Chair: Chakravarthy S R, In- dian Institute of Technology Madras, Chennai, India Session Co-Chair: Shailesh Singh Bhaisora, GE India Technology Center, Bangalore, India
1:30	Numerical Studies on the Effect of Design Trim on Aerodynamic Per- formance of a Micro Propeller for MAV Application GTINDIA2013-3671 Quamber Nagpurwala, Sagar R., S. Subbaramu, <i>M S Ramaiah School of Ad-</i> vanced Studies	Application of a High Order LES Approach to the Redistribution of Inlet Temperature Distortion in a Turbine GTINDIA2013-3545 Debasish Biswas, Aya Kitoh, Toshiba Corporation	Turbulent Behaviour in a Low Aspect Ratio Dump Combustior at Low Swirl Number GTINDIA2013-3734 N.P. Yadav, Bundelkhand Institute of Engineering and Technology, Abhijit Kushari, Indian Institute of Technology
2:00	Design Work of a Compressor Stage Through High-to-Low Speed Com- pressor Transformation GTINDIA2013-3506 Chenkai Zhang, Jun Hu, Zhiqiang Wang, Xiang Gao, Nanjing University of Aero- nautics and Astronautics	Effect of Different Turbulence Models on the Numerical Analysis of Axial Flow Turbine Stage of a Typical Turbofan Engine GTINDIA2013-3555 Seepana Ramana, Kishore Kumar, Gas Turbine Research Establishment	Development of Pyro Igniter for Gas Turbine Engine Application GTINDIA2013-3517 Jayaraman Kandasamy, VelTech Techni- cal University

2:30	Numerical Investigation of Outlet Hub Geometry on the Performance of Large Axial Fan GTINDIA2013-3583 Chao Yin, Jun Hu, <i>Nanjing University of</i> <i>Aeronautics and Astronautics</i>	Studies on Impact of Inlet Viscos- ity Ratio, Decay Rate and Length Scales in a Cooled Turbine Stage GTINDIA2013-3586 Karthik Srinivasan, <i>QuEST Global</i> , David Newman, <i>Rolls-Royce Plc</i>	Reduced Order Modelling of Com- bustion Instability in a Backward Facing Step Combustor GTINDIA2013-3559 C. Vamsi Krishna, Santosh Hemachan- dra, Indian Institute of Science
3:00	Study of the Velocity Flow Field Under Distorted Inflow Conditions for a High Aspect Ratio Low Speed Contra Rotating Fan GTINDIA2013-3594 Chetankumar Mistry, A.M. Pradeep, Indian Institute of Technology	Experimental Study on the Effect of Freestream Turbulence on the Development of an Inflectional Boundary Layer from the Semi-Cir- cular Leading Edge of a Flat Plate GTINDIA2013-3630 Subrata Sarkar, Samson Ratnakumar Annapureddy, Indian Institute of Tech- nology	Enhancing Gas Turbine Operation With Heavy Fuel Oil GTINDIA2013-3767 Vikram Muralidharan, <i>GE Power & Wa-</i> <i>ter,</i> Matthieu Vierling, <i>GE Energy Prod</i> - <i>ucts Europe</i>

	TECHNOLOGY BLOCK 1	Room KTMD	Room CSSD
	HEAT TRANSFER	STRUCTURES & DYNAMICS	CONTROLS, DIAGNOSTICS & INSTRUMENTATION
	Film Cooling	Rotordynamics	Controls
	Session Chair: Subrata Sarkar, Indian Institute of Technology, Kanpur, India Session Co-Chair: Kesavan V., Gas Tur- bine Research Establishment, Bangalore, India	Session Chair: Chandramouli Padma- nabhan, Indian Institute of Technology Madras, Chennai, India Session Co-Chair: Jay Ramachandran, GE Aviation, Bangalore, India	Session Chair: Venkateswarlu Andra, Defiance Technologies, Bangalore, India
1:30	Computational Study on Pressure Side Film Cooling and Flow Struc- ture GTINDIA2013-3696 Radheesh Dhanasegaran, Girish Ven- katachalapathy, Nagarajan Gnanasek- aran, SSN College Of Engineering	Comparative Study Between In- Situ Measured Vibration Data at Bearing and BTT on a LP Turbine Last Stage Blades in a Steam Tur- bo-Generator Set GTINDIA2013-3614 Wolfgang Hahn, <i>EDF, UK</i> , Jyoti Sinha, <i>University of Manchester</i>	Turbojet Engine Performance Tun- ing With a New Turbine Map Adap- tation Concept GTINDIA2013-3533 Gianluigi Alberto Misté, Ernesto Benini, University Of Padova
2:00	Experimental and Numerical Investigation of Effect of Blowing Ratio on Film Cooling Effectiveness and Heat Transfer Coefficient Over a Gas Turbine Blade Leading Edge Film Cooling Configurations GTINDIA2013-3552 Giridhara Babu Yepuri, Felix J., Vinod Kumar, CSIR-National Aerospace Labo- ratories, Gururaj Lalgi, Sreenivasa Rao K.V., Siddaganga Institute of Technol- ogy, Ashok Babu T.P., National Institute	Non-Linear Dynamics, Instability and Chaos of Two Spool Aero Gas Turbine Rotor System GTINDIA2013-3582 Narayanan Payyoor, Mayank Tiwari, <i>GE</i> <i>Aviation</i> , Kshitij Gupta, <i>Indian Institute</i> of Technology	A Design Environment for Perfor- mance Modeling and Analysis of Aero Engine Lubrication Systems GTINDIA2013-3542 Muralidhar Manavalan, Bommaian Bal- asubramanian, Prasath Mahendiran, Adithya S. Rao, Honeywell Technology Solutions
2:30	of Technology Effect of Hole Shape On Film Cool- ing Effectiveness Over A Flat Plate GTINDIA2013-3628 Felix J., Giridhara Babu Yepuri, Vinod Kumar, CSIR-National Aerospace Labo- ratories, Harshavardhana N., Rajanna D., Adichunchanagiri Institute of Tech- nology	Modal Analysis of Multi Layer Vis- coelastic Rotors Considering High- er Order Model GTINDIA2013-3670 Saurabh Chandraker, Haraprasad Roy, Gaurav Maurya, <i>National Institute of</i> <i>Technology</i>	Enhanced Fuel Flexibility and Emissions Compliance for Gas Tur- bines Through Model Based Con- trols Technology GTINDIA2013-3587 Ranjith Malapaty, Suresh MVJJ, <i>GE</i> <i>Power & Water</i>
3:00	Effect of Film Cooling Hole Area Ratio on Adiabatic Film Cooling Ef- fectiveness Over a Flat Plate GTINDIA2013-3629 Felix J., Giridhara Babu Yepuri, Vinod Kumar, CSIR-National Aerospace Labo- ratories, Jim Alen J., Siva Kumar P., J.J College of Engineering & Technology	Identification of Multiple Fault Parameters in a Rigid-Rotor and Flexible-Bearing-Coupling System: An Experimental Investigation GTINDIA2013-3774 Rajiv Tiwari, Mohit Lal, Indian Institute of Technology Guwahati	Model Based Crack Identification Using Full-Spectrum GTINDIA2013-3756 Rajiv Tiwari, Shravankumar Chan- drasekaran, Indian Institute Of Technol- ogy Guwahati
			14

December 6	5, 2013	Room ACD	Room FMCD	TECHNOLOGY BLOCK 2
		COMPRESSORS	TURBINES	COMBUSTION, FUELS & EMISSIONS
	Co	ompressor Design	Thermodynamics, Cycles & Systems I	Combustion Modeling
	Session M S Ram ies, Bang	Chair: Quamber Nagpurwala, aiah school of Advanced Stud- alore, India	Session Chair: KVL Rao, Aeronautical Development Agency, Bangalore, India	Session Chair: Santosh Hemachandra, Indian Institute of Science, Bangalore, India Session Co-Chair: Pranatharthiharan Athmanathan, Park College of Engineer- ing & Technology, Kaniyur, India
9:00	CFD Moo Spacer I pressor GTINDIA20 Vrushabl Marco Gi & Gas	deling to Study the Effect of Design on Centrifugal Com- Exit Scroll Performance 013-3593 nendra Patri, Uday Meduri, achi, Giuseppe Iurisci, , <i>GE Oil</i>	Innovative Gas Turbine Engine Cy- cle Aerothermodynamical Analysis GTINDIA2013-3522 Mustafa Ezzuldeen, Alexandria Univer- sity	Fundamental Combustion Calcula- tions with DARS and CHEMKINTM Software Packages: A Comparison GTINDIA2013-3539 Venkata Nori, Fang Xu, Honeywell Inter- national Inc
9:30	CFD An Flow Be Transon GTINDIA2 Shobhav Premaka <i>Laborato</i>	alysis to Understand the chaviour of a Single Stage ic Axial Flow Compressor 013-3592 athy M. Thimmaiah, Hanoca ra, <i>CSIR-National Aerospace</i> <i>ries</i>	Probabilistic Assessment of Ther- modynamic Output of an Inter- cooled-Reheated-Regenerative Brayton Cycle Coupled to Variable Temperature Heat Reservoirs GTINDIA2013-3556 Vishal Anand, Krishna Nelanti, Infotech Enterprises Ltd	NO Prediction in Turbulent Dif- fusion Flame Using Multiple Un- steady Laminar Flamelet Modeling GTINDIA2013-3683 Rakesh Yadav, Pravin Anant Rajeshirke, Pravin Nakod, <i>ANSYS</i>
10:00	Develop of Laby Analysis GTINDIA20 Mohana mar Kan Infotech	ment of Cavity Shapes winth Seals Through CFD 5 013-3544 Rao Ramanadham, Sravan Ku- chanapally, Balakrishna Gaja, Enterprises Ltd	Exergetic Analysis of Combined Cy- cle Power Plant With Single Steam Extraction GTINDIA2013-3740 Nikhil Dev, Rajesh Attri, YMCA Univer- sity of Science and Technology, Gopal Krishan Goyal, Bhiwani Institute of Tech- nology & Science, Naresh Kumar, BRCM College of Engineering & Technology	A Comparative CFD Study on Flamelet Generated Manifold and Steady Laminar Flamelet Model- ing for Turbulent Flames GTINDIA2013-3700 Pravin Nakod, Rakesh Yadav, Pravin An- ant Rajeshirke, Stefano Orsino, ANSYS

10:30 - 10:45 AM

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Coffee Break

	TECHNOLOGY BLOCK 1	Room KTMD	Room CSSD
	HEAT TRANSFER	STRUCTURES & DYNAMICS	MATERIALS & MANUFACTURING
	General GT Heat Transfer I	Fatigue, Fracture & Life I	Manufacturing of Gas Turbine Components
	Session Chair: Sanjeev Jain, <i>GE Power</i> & Water, Bangalore, India Session Co-Chair: Kesavan V., Gas Tur- bine Research Establishment, Bangalore, India	Session Chair: Baskaran Bhu- varaghan, <i>GE Aviation, Bangalore, India</i> Session Co-Chair: Raghavan Kotur, In- fotech Enterprises Ltd, Hyderabad, India	Session Chair: Asim Tewari, Indian In- stitute of Technology Bombay, Mumbai, India
9:00	Steady State Thermal Analysis of Afterburner Liner GTINDIA2013-3615 Suresh Batchu, Kishore Kumar S., Gas Turbine Research Establishment	Structural Integrity Validation for Rotor Discs and Shafts in Aero- Engines GTINDIA2013-3558 Rajeevalochanam B.A., Sanju Kumar, Rashmi Rao, Venkateshwarlu M., Gas Turbine Research Establishment	Manufacturing of a Radial Inflow Turbine for Microgas Turbine in a 3 Axis CNC Milling Machine GTINDIA2013-3541 Varadarajan M N, Mohanasundaram M E, Sampath K, <i>CSIR-National Aerospace</i> <i>Laboratories</i>
9:30	A Numerical Model for Unsteady Oil Film Motion in Aero-Engine Bearing Chambers and Experimen- tal Verification GTINDIA2013-3639 Zhenxia Liu, Zhao Jingyu, Hu Jianping, Lu Yaguo, Northwestern Polytechnical University	Finite Element Analysis for Predic- tion of Growth of Rotating Disc of Aero Engine During Over-Speed and Burst-Speed Condition and Validation of Results Through Ex- periment GTINDIA2013-3625 Rudra Goud M., Manjunatha C., Ven- kateshwarlu M., Patnaik BVA, <i>Gas Tur- bine Research Establishment</i>	Application Of Fuzzy Logic Control Strategy For Temperature Control In Friction Stir Welding GTINDIA2013-3790 Varun Das Ramdoss, Kalaichelvi ven- katesan, Karthikeyan Ramanujam, Birla Institute of Technology & Science, Pilani – Dubai Campus
10:00	Heat Transfer Analysis of a Gas Tur- bine and Improving Predictability Using Prototype Test Data GTINDIA2013-3701 Vishnu Vardhan Reddy, Roberto De Prosperis, <i>GE</i>	Life Extension of Axial Compressor Disc of a Turbo-Shaft Engine GTINDIA2013-3645 S. Esakki Muthu, Selwyn Anbarasan, Hardik Roy, Girish D.K., <i>Hindustan Aero-</i> <i>nautics Ltd.</i>	Weld Ductility Evaluation Of Aero- engine Materials By Performing Bend Tests GTINDIA2013-3640 Vijay Petley, Shweta Verma, Ashique KM, DM Purushothama, R Rajendran, Gas Turbine Research Establishment

10:30 - 10:45 AM

Coffee Break

STRUCTURES & DYNAMICS

Fatigue, Fracture & Life II

Session Chair: Baskaran Bhuvaraghan, *GE Aviation, Bangalore, India* Session Co-Chair: Raghavan Kotur, *Infotech Enterprises Ltd, Hyderabad, India*

Aeroderivative Gas Turbine Coupling Generator Redesign GTINDIA2013-3720

10:45 Alejandro Hernandez-Rossette, Zdzislaw Mazur, Rafael Garcia Illescas, *Electrical Research Institute of Mexico*

11:15

11:45

Comparative Study of Flange-to-Seal Contact Couplings With Bolt Relaxation Under Creep Condition GTINDIA2013-3529 Mao Jianfeng, Wang Weizhe, Shanghai Jiaotong University, Zhang Junhui,

hai Jiaotong University, Zhang Junhui, Shanghai Electric Power Company

Life Prediction of Directionally Solidified Air Cooled HPT Gas Turbine Blade Used in a Supersonic Aircraft Using FEM

GTINDIA2013-3572

S. Esakki Muthu, Dileep S., Sajikumar Somanthampy, Girish D.K., *Hindustan Aeronautics Ltd*

Room ACD

Lecture Session

Historical Perspective of Fan Aerodynamics

Session Chair and Lecturer: Aspi Wadia *,GE Aviation*

The lecture will review the evolution of aircraft engine fan aerodynamics in the last quarter century. Starting from the development of fan blades with part span shrouds, the lecture will show the key milestones in fan technology, including wide chord fan blades, swept fan blades, and open rotors.

11:15 - 12:15

TECHNOLOGY BLOCK 2

RENEWABLE ENERGY

Renewable Energy Systems, Design, Performance & Economics

Session Chair: Chakradhar Byreddy, GLRC

Session Co-Chair: Arunachalam Pichukuppan, Hindustan Aeronautics Ltd, Bangalore, India

Performance Analysis of a Casement Type Vertical Axis Wind Turbine

GTINDIA2013-3752

Sharad Jagtap, *ABMSP's Anantrao Pawar College of Engineering*, Sandeep Sitaram Wangikar, Sushil Shinde, Abhishek Pore, Abhijeet Tarmude, *SVERI's College of Engineering*, *Pandharpur*

Investigations on the Effect of Aspect Ratio Into the Performance of Savonius Rotors

GTINDIA2013-3729 Sukanta Roy, Ujjwal K. Saha, Indian Institute of Technology Guwahati

12:15 - 1:15 PM

Lunch



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For questions, please contact: **ASME International Gas Turbine Institute** 6525 The Corners Pkwy., Ste. 115 Norcross, Georgia 30092 USA Tel: +1-404-847-0072 Fax: +1-404-847-0151 Email: igtiweb@asme.org

December 6,	2013 Room ACD	Room FMCD	TECHNOLOGY BLOCK 2
	COMPRESSORS	TURBINES	COMBUSTION, FUELS & EMISSIONS
	Compressor Flow Studies II	Thermodynamics, Cycles & Systems II	Atomization & Spray I
	Session Chair: Kulaveeran Murug- esan, CSIR-National Aerospace Labora- tories, Bangalore, India Session Co-Chair: Chaitanya Ongole, GE Aviation, Bangalore, India	Session Chair: A.M. Pradeep, Indian Institute of Technology Bombay, Mum- bai, India	Session Chair: Ravikrishna R. V., Indi- an Institute of Science, Bangalore, India
1:15	A Study of Existing Multistage Transonic Axial Compressor Design for Surge Margin Improvement GTINDIA2013-3616 Baljeet Kaur, Ajay Pratap, Nitin Balsaraf, <i>Gas Turbine Research Establishment</i>	Design and Analysis of a High Pres- sure Turbine Using Computational Methods for Small Gas Turbine Ap- plication GTINDIA2013-3606 Kishor Kumar, Prathapanayaka R, <i>CSIR-</i> <i>National Aerospace Laboratories,</i> S. V. Ramanamurthy, Kishore Kumar S., <i>Gas</i> <i>Turbine Research Establishment,</i> Ajay Krishna T M, <i>Visvesvaraya Technological</i> <i>University</i>	Numerical Investigation of Trans- verse Jet in Cross-Flow Using CFD Techniques GTINDIA2013-3516 Pushpander Rathore, Rajagopal Thundil Karuppa Raj, VIT University
1:45	Experimental Studies on Stall Be- havior in a Single Stage Transonic Axial Flow Compressor GTINDIA2013-3620 Dilip B. Alone, S Satish Kumar, Shob- havathy M Thimmaiah, Janaki Rami Reddy M, Venkat S Iyengar, Ramamur- thy S, <i>CSIR-National Aerospace Labora-</i> <i>tories,</i> A.M. Pradeep, <i>Indian Institute of</i> <i>Technology Bombay</i>	Simulation of Turboexpander Po- tential in a City Gate Station Under Variations of Feed Characteristic GTINDIA2013-3658 Taranom Parhizgar, Kaveh Ghorbanian, Sharif University of Technology, Pedram Hanafizadeh, University of Tehran	Experimental Investigation of Liq- uid Jet Breakup in Cross Flow of Swirling Air Stream GTINDIA2013-3624 Tushar Sikroria, Abhijit Kushari, Indian Institute of Technology Kanpur, Saadat Syed, Jeffery Lovett, Pratt & Whitney
2:15	Stage by Stage Modeling of Surge in Centrifugal Gas Compressors GTINDIA2013-3655 Rozhin Saboori, Kaveh Ghorbanian, Sharif University of Technology	Graph Theoretic Analysis of Ad- vance Combined Cycle Power Plants Alternatives With Latest Gas Turbines GTINDIA2013-3760 Nikhil Dev, Rajesh Attri, YMCA Univer- sity of Science and Technology, Gopal Krishan Goyal, Bhiwani Institute of Tech- nology & Science, Naresh Kumar, BRCM College of Engineering & Technology	Numerical Simulations of Liquid Jet Break Up in a Crossflow GTINDIA2013-3690 Mohit Jain, R Suryaprakash, Gaurav Tomar, Ravikrishna R. V., B. N. Rag- hunandan, Indian Institute of Science Bangalore

2:45 - 3:00 PM

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Break

	Room KTMD	Room CSSD	TECHNOLOGY BLOCK 1
	STRUCTURES & DYNAMICS	CONTROLS, DIAGNOSTICS & INSTRUMENTATION	RENEWABLE ENERGY
	Structural Mechanics & Vibration I	Instrumentation & Sensors	Aerodynamics & Acoustics
	Session Chair: Asim Ghosal, <i>GE Avia-</i> <i>tion, Bangalore, India</i> Session Co-Chair: RMVGK Rao, <i>Am-</i> <i>ritha University, Bangalore, India</i>	Session Chair: Parag Acharya, <i>GE, Hy-</i> <i>derabad, India</i>	Session Chair: Venkatakrishnan L., CSIR-National Aerospace Laboratories, Bangalore, India Session Co-Chair: Jitendra Bijlani, LM Wind Power Technologies, Bangalore, India
1:15	A Study on Bird Impact Damages on Shrouded Fan Blades of an Aero-Engine GTINDIA2013-3804 Raghu Prakash, <i>Indian Institute of Tech- nology Madras</i> , Anandavel Kaliyape- rumal, Hithesh Channegowda, <i>Infotech</i> <i>Enterprises Ltd</i>	Bearing Failure Investigation of Turbomachinery Test Rig GTINDIA2013-3611 Veera Sesha Kumar C, Dileep Kumar B Alone, Janaki Rami Reddy M, Man- ickam Jayaraman, <i>CSIR-National Aero-</i> <i>space Laboratories</i> , Vijay Tijare, <i>SKF</i> <i>Technologies India</i>	Numerical Study on the Effect of Limiting Eddy Viscosity on Flow Separation Prediction for Airfoils in Wind Energy Applications GTINDIA2013-3816 Jaikumar Loganathan, Anindya Sen- gupta, Ashok Gopinath, <i>GE</i>
1:45	Design and Experimental Valida- tion of a Radial Air Turbine Wheel of an Air Starter for Fighter Aircraft Application GTINDIA2013-3526 Amar Singh, Joseph Shibu K., Hin- dustan Aeronautics Ltd, R. K. Mishra, Center for Military Airworthiness and Certification	Aero-Thermodynamic Modelling and Gas Path Simulation for a Twin Spool Turbo Jet Engine GTINDIA2013-3643 Thennavarajan S, Brijeshkumar Shah, Balaji Sankar, Vijayendranath Vanam, Soumendu Jana, Ramamurthy S, <i>CSIR-National Aerospace Laboratories,</i> Radhakant Satpathy, <i>Center for Military</i> <i>Airworthiness and Certification,</i> Satish K Yadav, <i>Hindustan Aeronautics Ltd</i>	Effect of Inflow Conditions on Wind Turbine Blade Performance GTINDIA2013-3737 Kiran Kumar, Sudhakar Piragalathal- war, Jitendra Bijlani, Jesper Madsen, <i>LM Wind Power Technologies</i>
2:15	Health Monitoring of Gear Ele- ments Based on Time-Frequency Vibration Data by Support Vector Machine Algorithms GTINDIA2013-3772 Rajiv Tiwari, Dhruba Jyoti Bordoloi, Indian Institute of Technology Guwahati		Numerical Investigations on the Use of Multi-Element Blades in Vertical Axis Wind Turbines GTINDIA2013-3505 Lakshmi Sankar, Elhadji Bah, Jechiel Jagoda, <i>Georgia Institute of Technology</i>

2:45 - 3:00 PM

Break



December 6, 2	013 Room ACD	Room FMCD	TECHNOLOGY BLOCK 2
	COMPRESSORS	TURBINES	COMBUSTION, FUELS & EMISSIONS
	Pump Performance	Design & Optimization	Combustion CFD Application
:	Session Chair: Murari Sridhar, Honey- well, Hyderabad, India	Session Chair: A.M. Pradeep, Indian Institute of Technology Bombay, Mum- bai, India	Session Chair: Shankar Venkataraman, Christ University, Bangalore, India Session Co-Chair: Madhukar Rao, ACRi Infotech, Bangalore, India

Exit Blade Angle and Roughness Effect on Centrifugal Pump Performance GTINDIA2013-3531

Sayed A.I. Bellary, Abdus Samad, Indian Institute of Technology Madras

3:00

3:30

4:00

21

Influence of Pre-history and Leading Edge Contouring on Aeroperformance of a 3D Nozzle Guide Vane

GTINDIA2013-3535 Ranjan Saha, Jens Fridh, Björn Laumert, Torsten H. Fransson, *KTH Royal Institute of Technology*, Boris I. Mamaev, *Siemens* Parametric Study of Moss-Brookes (MB) and Moss-Brookes-Hall (MBH) Model Constants for Prediction of Soot Formation in a Turbulent Higher Hydrocarbon Flames GTINDIA2013-3689

Pravin Anant Rajeshirke, Rakesh Yadav, Pravin Nakod, Stefano Orsino, ANSYS

Design and Analysis Software for Propellers

GTINDIA2013-3681 Prathapanayaka R, Vinod Kumar N, SJK Murthy, Hari Krishna Nagishetty, *CSIR-National Aerospace Laboratories*

Numerical Studies on the Effect of Tip Clearance and Tip Cooling Flow on Endwall Losses of an Unshrouded Axial Turbine Rotor

GTINDIA2013-3568

Quamber Nagpurwala, *M S Ramaiah* School of Advanced Studies, Asgar Ali Kankudti, *QuEst Global*, Abdul Nassar, SoftInWay Turbomachinery Solutions, S. V. Ramanamurthy, *Gas Turbine Research* Establishment

An Advanced Unstructured-Grid Finite-Volume Design System for Gas Turbine Combustion Analysis GTINDIA2013-3537

M. S. Anand, Ruud L.G.M. Eggels, Max Staufer, Marco Zedda, Jiang Zhu, *Rolls-Royce*

Effect of Trailing Edge Crenulation on the Performance and Stall Margin of a Transonic Axial Compressor GTINDIA2013-3768

Quamber Nagpurwala, S. Subbaramu, A.T. Sriram, *M S Ramaiah School of Advanced Studies*

Influence of Different Rib Height on Heat Transfer Augmentation in Rectangular Convergent / Divergent Channels With Continuous Ribs on Bottom Surface GTINDIA2013-3570

Sivakumar Karthikeyan, Natarajan Elumalai, Anna University, N Kulasekharan, Saveetha Engineering College

Design and Testing of a Can Combustor for a Small Gas Turbine Application

GTINDIA2013-3691 KVL Narayana Rao, Mookiah Devathathan, Ravikumar N, Ramesha Ganganna, *Hindustan Aeronautics Ltd*

HEAT TRANSFER STRUCTURES & DYNAMICS MATERIALS & MANUFACTURING Structural Mechanics **Convective Cooling Materials Properties** & Vibration II Session Chair: S. V. Prabhu, Indian Insti-Session Chair: Asim Ghosal, GE Aviation, Session Chair: Anand Krishnamurthy, GE tute of Technology Bombay, Mumbai, India Bangalore, India Power & Water, Bangalore, India Session Co-Chair: Karthik Srinivasan, Session Co-Chair: RMVGK Rao, Amritha QuEST Global, Bangalore, India University, Bangalore, India

Experimental Investigation of Flow Characteristics in a Square Duct With Delta-Wing Vortex Generators

3:00

CTINDIAS

GTINDIA2013-3773 Vadiraj Katti, Anandkumar Malipatil, Mahesh Ingalagi, B.L.D.E.A's V.P. Dr.P.G.Halakatti College of Engineering and Technology

Free Vibration Responses of Functionally Graded Spherical Shell Panels Using Finite Element Method

GTINDIA2013-3693 Vishesh Ranjan Kar, Subrata Kumar Panda, National Institute of Technology

Isothermal Fatigue Behaviour of Two Nickelbase Alloys for Turbine Blades of Fighter Aircraft Engines GTINDIA2013-3682

Benudhar Sahoo, Sashi Kanta Panigrahi, Radhakant Satpathy, Center for Military Airworthiness and Certification

Comparison of Data Processing Techniques for Convective Heat Transfer Measurements in a Transient Transonic Hot Wind Tunnel GTINDIA2013-3733

3:30

Song Xue, Arnab Roy, Srinath Ekkad, Wing-Fai Ng, Virginia Polytechnic Institute & State University

Linear Static and Free Vibration Analysis of Laminated Composite Spherical Shells GTINDIA2013-3712 Vijay Singh, Subrata Kumar Panda, National Insitute of Technology

A Study on Coatability of Linz-Donawitz (LD) Slag by Plasma Spraying Route GTINDIA2013-3534 Pravat Ranjan Pati, Alok Satapathy, National Institute of Technology

Cooling Efficiency Enhancement Using Impingement Cooling Technique for Turbine Blades GTINDIA2013-3803

4:00

Keerthivasan Rajamani, Madhu Ganesh, PSG College of Technology, Balamurugan Srinivasan, Karthikeyan Paramanandam, Chandiran Jayamurugan, Sridharan Narayanan, Honeywell Technology Solutions, A. Chandran Jain University

Gas Turbine Blade Damper: A Design Optimization Study to Mitigate High Resonance Blade Vibration

GTINDIA2013-3748 Dilip Kumar, Suresh T.N, Sanjay Barad, Gas Turbine Research Establishment A Comparative Study on the Synthesis and Properties of Yttria Stabilized Zirconia (YSZ) and Lanthana Doped YSZ Plasma Sprayed Thermal Barrier Coatings GTINDIA2013-3563

Aruna S T, Balaji N, ArulPaligan A, CSIR-National Aerospace Laboratories



ecember 6, 2013	Room ACD	TECHNOLOGY BLOCK 2	TECHNOLOGY BLOCK 1
	COMPRESSORS	COMBUSTION, FUELS & EMISSIONS	HEAT TRANSFER
	Gas Turbine Engine Components	Atomization & Spray II	General GT Heat Transfer III
Sessi tute of Sessi CERFAG	on Chair: Bhaskar Roy, <i>Indian Insti-</i> Technology Bombay, Mumbai, India on Co-Chair: Marc Montagnac, CS, Toulouse, France	Session Chair: Ravikrishna R. V., Indian Institute of Science, Bangalore, India	Session Chair: Sanjeev Jain, GE Power & Water, Bangalore, India Session Co-Chair: Kesavan V., Gas Turbine Research Establishment, Bangalore, India
Perfo Pumj GTIND I:30 K Anil <i>Turbin</i>	brmance Evaluation of Gear p by 2d Unsteady CFD Analysis IA2013-3607 I Kumar, N Balamuralikrishnan, Gas e Research Establishment	Drop Size Characteristics of For- ward Angled Injectors in Subsonic Cross Flows GTINDIA2013-3706 Venkat S Iyengar, Sathiyamoorthy K, Srini- vas J, Manjunath P, <i>CSIR-National Aerospace</i> <i>Laboratories</i>	Parametric Studies on Bolted Flange Thermal Analysis to Im- prove LCF Life GTINDIA2013-3679 Krishna Nelanti, Yousuf Mohd, Rajendra Prasad Allabanda, <i>Infotech Enterprises</i> <i>Ltd</i>
An As	ssessment of Turbulence Mod-	Experimental Investigation of a	Coolant Gas Injection on a Plunt

An Assessment of Turbulence Models for S-Duct Diffusers With Flow Control

GTINDIA2013-3566 Sourabh Bhat, University of Petroleum and Energy Studies, R.K. Sullerey, Indian Institute of Technology Kanpur

Experimental Investigation of a Hollow Cone Spray Using Laser Diagnostics

GTINDIA2013-3709 Mithun Das, Souvick Chatterjee, Swarnendu Sen, Jadavpur University, Achintya Mukhopadhyay, Indian Institute of Technology Madras

Coolant Gas Injection on a Blunt-Nosed Re-Entry Vehicle

GTINDIA2013-3738 Jeswin Joseph, Shine S R, Indian Institute of Space Science and Technology

Development of a Novel Technique to Forecast Compressor Fouling in a Turbo Shaft Engine GTINDIA2013-3602

5:30

23

5:00

S. Esakki Muthu, Sajikumar Somanthampy, Dileep S., *Hindustan Aeronautics Ltd*, R. K. Mishra, *Centre for Military Airworthiness and Certification*

Effect of Inlet Tangential Port Area on Droplet Size Distribution of Small-Scale Simplex Atomizer GTINDIA2013-3549

Muthu Selvan Govindaraj, Muralidhara H. Suryanarayana Rao, Vinod Kumar Vyas, *CSIR-National Aerospace Laboratories*, Narendran N. Venugopal, Karthy Shanmugasundaram, Karthic M. Sankar, *Bangalore Institute of Technology*

	Room KTMD	Room CSSD	Room FMCD
	STRUCTURES & DYNAMICS	CONTROLS, DIAGNOSTICS & INSTRUMENTATION	RENEWABLE ENERGY
	Structural Analyses	Monitoring & Diagnostics II	Hydroturbines, Structures & Dynamics
	Session Chair: Asim Ghosal, GE Aviation, Bangalore, India Session Co-Chair: RMVGK Rao, Amritha University, Bangalore, India	Session Chair: Amitava Datta, Jadavpur University, Kolkata, India	Session Chair: Prem Babu, Suzlon Energy Ltd, Pune, India
4:30	Correlation Between FEA and Test- ing for HCF-Safety Assessment of an Aero Engine Turbine Rotor Blade GTINDIA2013-3697 Reshma Khan, Owais Majid Kamili, Suresh T.N, Gas Turbine Research Establishment, Shylaja S., Defence Research and Develop- ment Organisation	Pre Emptive Rotor Blade Damage Identification by Blade Tip Timing Method GTINDIA2013-3743 Siddhartha S. Guru, Shylaja S., Sunil Kumar, Ramesh Murthy, Defence Research and De- velopment Organisation	Reduced Order Modeling of Deflec- tion of a Membrane Covered Airfoil in a Fluid Flow GTINDIA2013-3817 Srinath Devaki Narayana Murthy, Jaikumar Loganathan, Ashok Gopinath, <i>GE</i>
5:00	An Evaluation of ASME's "Design by Analysis" Guidelines GTINDIA2013-3626 Raghavan Kotur, <i>Infotech Enterprises Ltd</i>	High Sampling Rate Measure- ments of Jet Engine Fuel Control System Transients for Study on the Effect of Modification in Change- over Valve GTINDIA2013-3744 Tarun Uppal, Prakash Yadu, Sudhakar Kan- nur, D N Ravindra, Ananda Kumar, <i>Gas Tur- bine Research Establishment</i>	An Assesment of Turbulence Mod- els for Predicting the Fluid Flow in Spiral Casing of a Hydraulic Tur- bomachine Using SUPG-Finite Ele- ment Method GTINDIA2013-3762 Parameswara rao Nakkina, Arul Prakash Karaiyan, Indian Institute of Technology Madras

Thermo-Mechanical Stability Analysis of Composite Cylindrical Panels

5:30 GTINDIA2013-3651 Pankaj Katariya, Subrata Kumar Panda, National Institute of Technology Rourkela Comparison of Acoustic Velocity Perturbation Measurements Using PIV Vs. Two-Microphone Technique GTINDIA2013-3512 Saravanan Balusamy, Simone Hochgreb,

University of Cambridge

Identification of Critical Operating Conditions Which Lead to Premature Failures of Gearbox Components Due to Vibration by Early Detection of the Aging of the Lubricating Oil Before Material Damage Occurs

GTINDIA2013-3521 Manfred Mauntz, *cmc Instruments GmbH*, Ulrich Kuipers, *University of Applied Sciences*



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