

FOURTH SYMPOSIUM ON
APPLIED AERODYNAMICS AND DESIGN OF AEROSPACE VEHICLES
(SAROD 2009)

Science, Technologies and Industry Practice in Aerodynamics and Design

10-12 DECEMBER 2009
Eagleton Resort, Bengaluru

TECHNICAL PROGRAMME

Thursday December 10, 2009

9:00 - 10:45 am: Inaugural Session

LOTUS Hall

**Welcome Address, introduction of Chief Guest, and keynote speakers
by Dr Sajeer Ahmed, Chairman, NOC, SAROD 2009**

Address by Mr. Biju Uthup, Co-Chairman, NOC, SAROD 2009, Aeronautical Development Agency

Chief Guest Address by Dr. K. Radhakrishnan, Chairman, ISRO and Secretary, DOS

Presidential Address by Dr. A R Upadhya, Director, National Aerospace Laboratories - CSIR

Keynote Lecture “Boomerangs – In India and Elsewhere ” – Prof. R. Narasimha, JNCASR

Honoring of Eminent Aerodynamicists

Vote of Thanks

10:45 – 11:30 am: High Tea

LOTUS Hall

11:30 am – 12:15 pm

Plenary Talk 1 – “Assessment of CFD Work in India”, Prof. Gopal R. Shevare, IIT-Bombay, Mumbai

Chair : Prof. Joseph Mathew, IISc, Bangalore

THURSDAY, DECEMBER 10, 2009				
12:15 – 1:45 pm Sessions 1 and 2				
12:15 pm	12.45pm	1:05 pm	1:25 pm	1:45 pm – 2:30pm
	1	2	3	
SESSION 1: CFD APPLICATIONS - I				LOTUS Hall
Chair: Dr. R. Krishnamurthy, DRDL, Hyderabad				
	SAROD 2009-116	SAROD 2009-117	SAROD 2009-118	
Invited Talk – I				LUNCH
“CFD in Business Aviation: The Challenge and the Promise” Dr. Chittur Venkatasubban, Hawker Beechcraft Cor., Kansas, USA	CFD in Design Cycle for Jetvane Application G. Aswin, Malsur Dharavath and P.K.Sinha CCD Division, DOCD, DRDL Hyderabad	Trajectory Prediction of Artillery Rockets with a Wrap around Fin (WAF) Configuration using CFD Data Sanjay Kumar, Sudhir Muthyala Zeus Numerix Pvt. Ltd, Pune. K.J Daniel Armament Research and Development Establishment, Pune	Computations using the code HiFUN for Common Research Model, an AIAA Drag Prediction Workshop configuration Ravindra K., Nikhil Vijay Shende and N. Balakrishnan Indian Institute of Science, Bangalore	
SESSION 2: NAVIGATION AND GUIDANCE				GULMOHAR Hall
Chair:				
SAROD 2009- 103	SAROD 2009-119		SAROD 2009-120	
Invited Talk – II				LUNCH
“Autonomous Trajectory Control Strategies for Un-powered Winged Entry Vehicles” Mr. K. Sivan, Vikram Sarabhai Space Centre, Thiruvananthapuram	Navigational Accuracy Improvement for Low Cost Inertial Platform C Kamali and A A Pashilkar, National Aerospace Laboratoires - CSIR, Bangalore	Post Flight Estimation Of Time Of Launch (TOL) Wind from Trajectory and Strain Data of a Launch Vehicle Balamurugan S, Santosh Kumar Dehury and Priyankar Bandyopadhyay Vikram Sarabhai Space Centre Trivandrum	Developing GUI for Assessing Reliability of Weapon System using UML 2.0 T V Suresh Kumar, K Rajani Kanth, M S Ramaiah Institute of Technology, Bangalore	

THURSDAY, DECEMBER 10, 2009

2:30 – 4:30 pm Sessions 3 and 4

2:30pm	3:00pm	3:20pm	3:40pm	4:00pm	4:30-4:45 pm
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SESSION 3: ALGORITHMS AND MODELING **LOTUS Hall**
 Chair: Dr. J. S. Mathur, NAL-CSIR, Bangalore

SAROD 2009-104	SAROD 2009-121	SAROD 2009-122	SAROD 2009-123	SAROD 2009-124	
<p>Invited Talk – III</p> <p>“Development of High-Lift Systems for the Bombardier CRJ-700”</p> <p>Dr. Francois Pepin, Bombardier, Montreal, Canada</p>	<p>Low Speed Flow Computation Over Cartesian Grid With Preconditioning Technique</p> <p>Amit Sachdeva, K Manokaran Aerodynamics Design Division, Vikram Sarabhai Space Centre, Thiruvananthapuram</p>	<p>Understanding physics of high lift aerodynamics using the code HiFUN</p> <p>Ravindra K., Nikhil Vijay Shende and N. Balakrishnan Indian Institute of Science, Bangalore</p>	<p>Mathematical and Experimental methods of load estimation on Control Lines of Ram Air Parachute</p> <p>Balraj Gupta, Vipin Kumar, and Ravi Krishna, Aerial Delivery Research and Development Establishment, Agra S. C. Upadhyaya, Dr. B. R. Ambedkar University, Agra, A. K. Ghosh Indian Institute of Technology Kanpur</p>	<p>On transition modeling in general CFD codes using correlations</p> <p>T Venkateswaran and Joseph Mathew Indian Institute of Science, Bangalore</p>	TEA

SESSION 4: AEROELASTICITY **GULMOHAR Hall**
 Chair: Mr. N G Vijaya Vittala, NAL-CSIR, Bangalore

SAROD 2009-105	SAROD 2009-125	SAROD 2009-126	SAROD 2009-127	SAROD 2009-128	
<p>Invited Talk – IV</p> <p>“Prediction of Transonic Flutter”</p> <p>Dr. Gautam SenGupta, Boeing, USA</p>	<p>Flutter Prediction using Flight Flutter Test Data of a Flexible Aircraft</p> <p>Sudha, U. P. V and J V Kamesh, Aeroelasticity Group, Airframe Directorate, Aeronautical Development Agency Kartik Venkatraman, Indian institute of Science, Bangalore, Girish Deodhare, ADA, Bangalore</p>	<p>Unsteady RANS based Impulse Response Studies of NACA 64A010 Airfoil for Aeroelastic and Flutter Analysis</p> <p>M. A. Padmanabhan and J. V. Kamesh Aeronautical Development Agency, Bangalore. S. V. Sajjan, V. Mudkavi National Aerospace Laboratories - CSIR, Bangalore, India G. SenGupta, The Boeing Company, Seattle, USA</p>	<p>Flutter Analysis of Airfoil using State-Space Method and Eigenvalue approach</p> <p>Anoop A.M, Amrita School of Engineering, Coimbatore, India Ganesh, R., Hindustan College of Engineering, Chennai, India Somenath Mukherjee, Manjuprasad M. National Aerospace Laboratories -CSIR, Bangalore</p>	<p>Development and Validation of Fluid-Structure Interaction Analysis Tools</p> <p>Y H Kim, R Koomullil, B Soni, and J E Kim University of Alabama at Birmingham, Alabama, USA</p>	TEA

THURSDAY, DECEMBER 10, 2009

4:45 – 6:45 pm Sessions 5 and 6

4:45 pm

5:15 pm

5:35 pm

5:55 pm

6:15 pm

SESSION 5: SPACE APPLICATIONS

LOTUS Hall

Chair: Mr. A . E. Sivaramakrishnan, VSSC, Thiruvananthapuram

	SAROD 2009-132	SAROD 2009-129	SAROD 2009-130	SAROD 2009- 131
An integrated Design Tool for Optimization of Integrally Stiffened Airframe Panels of a Hypersonic Re-entry Vehicle Krishan Kumar, Manoj Kumar T, Prashanthan A, M K Krishnan and S. Sirajudeen Ahamed Vikram Sarabhai Space Centre, Trivandrum	Effect of Tip Mass and Slenderness Ratio on the Stability of a Slender Launch Vehicle M. Trikhaa, D. Roy Mahapatra, S. Gopalakrishnan and R. Pandiyana, ISRO Satellite Centre, Bangalore. Indian Institute of Science, Bangalore	Mono-stability Characteristics of Re-entry Modules – CFD Studies Md Shafeeq Ahmed, Vinod Kumar, Amit Sachdeva and Pankaj Priyadarshi, Vikram Sarabhai Space Centre, Thiruvananthapuram.	Effect of Transport Coefficients on Aero-thermal Predictions of Re-entry Flows Siva K. Reddy, and Krishnendu Sinha, Indian Institute of Technology Bombay, Mumbai	Heat Flux Distribution over Forebody of Reentry Vehicles T Sivamurugan, D S Antuvan and K. Sivan, Vikram Sarabhai Space Centre, Thiruvananthapuram

SESSION 6: HYPERSONIC AIRBREATHING ENGINES

GULMOHAR Hall

Chair: Mr. Lazar Chitilappilly, VSSC, Thiruvananthapuram

SAROD 2009-107	SAROD 2009-135	SAROD 2009-133	SAROD 2009-134	SAROD 2009-170
Invited Talk – V “French R&T Effort for High-Speed Airbreathing Propulsion” Dr. Francois Falempin, MBDA, France	Experimental Study on Effect of Cowl Hinge Location on Starting Characteristics of Hypersonic Inlet A Satyanarayana, Ch Srikanth, J Chandra Sekhar, S V Ramana, Defence Research and Development Laboratory, Hyderabad	Improvements in Intake Starting Characterization for a Hypersonic Cruise Vehicle T .Ganesh Anavaradham, V Thiagarajan and S Panneerselvam Defence Research and Development Laboratory, Hyderabad	Scramjet Air Intake Studies in Hypersonic Mach number R.Saravanan, S.Subramanian, R.Kalimuthu, Manoj Kumar Singh & S.Pandian Vikram Sarabhai Space Center, Thiruvananthapuram	Design of a supersonic ‘Air intake model’ for intake characterisation studies Rajeev. G , Bharath Katta, National Aerospace Laboratories – CSIR , Bangalore

6:45 – 7:30 pm: Vendors Session

GULMOHAR Hall

7:30 – 9:30 pm: Banquet Dinner – Sponsored by Hindustan Aeronautics Limited, Bangalore

POOL SIDE

FRIDAY, DECEMBER 11, 2009

LOTUS Hall

9:00 am: Plenary Talk 2: “Aircraft Design – Indian perspective”, Mr. P. Jayasimha, General Manager, ARDC, HAL, Bangalore

Chair: Dr. Satish Chandra, NAL-CSIR, Bangalore

9:45 am: Invited Talk VI: “Advances in Nonlinear Computational Aeroelasticity”, Prof. Charbel Farhat, Stanford University, USA,

Chair: Prof. Karthik Venkataraman, IISc, Bangalore

10:15 am:Tea

10:30 - 12:30 pm Sessions 7 and 8

LOTUS Hall

10:30 am

11:00 am

11:20 am

11:40 pm

12:00 pm

SESSION 7: HYPERSONIC FLOWS – I

Chair: Prof. K. P. J. Reddy, IISc, Bangalore

SAROD 2009-139

SAROD 2009-137

SAROD 2009-138

SAROD 2009-136

Invited Talk – VII

“The Study of Radiating Hypervelocity Flows”

Prof. Richard Gareth Morgan, University of Queensland, Australia

A Study of the Flow through a Supersonic Air-Intake and Control of Internal Boundary Layer by Natural Ventilation

Ritukanchan Dubey,
G K Suryanarayana
National Aerospace Laboratoires - CSIR, Bangalore,
Job Kurian, Indian Institute of Technology Madras, Chennai

Hypersonic Inviscid Flow Field Analysis for a Re-entry Crew Module

N. Asokarajan
Vikram Sarabhai Space Centre, Thiruvananthapuram.

Unsteadiness in Supersonic Air-Intake at Supercritical Condition

S. Das and J. K. Prasad
Birla Institute of Technology, Mesra, Ranchi

Effect of strakes on the aerodynamic characteristics of a one-half power-law body at hypersonic speeds

Pushkaraj D. Sonawane
S. Pavithran, Vishwakarma Institute of Information Technology, Pune.,
Roschelle Martis,
Amarjit Singh, DIAT, Pune

SESSION 8 : CONTROL AND TRAJECTORY OPTIMIZATION GULMOHAR Hall

Chair: Dr. Girija Gopalarathnam, NAL-CSIR, Bangalore

SAROD 2009-108

SAROD 2009-140

SAROD 2009-141

SAROD 2009-1

SAROD 2009-154

**Invited Talk – VIII
“Development of UAV Research Platform for Randomized Path Planning and Control”**
Prof. M. Seetharama Bhat, IISc, Bangalore

MDO Problem Formulation for Launch Vehicle Conceptual Design Using Bi-Level Decomposition Strategy

C.Geetha Krishnan, V.Adimurthy,
Vikram Sarabhai Space Centre, Trivandrum, India
P. M.Mujumdar, K.Sudhakar
Indian Institute of Technology- Bombay, Mumbai

Analytical solution of partial output feedback pole placement in single-input systems

Gopal Jee, B B Das Vikram Sarabhai Space Centre, Thiruvananthapuram,
Ashok Joshi,
Indian Institute of Technology, Bombay, Mumbai

Analytical solution of partial output feedback Proposed Indian Manned Mission to Moon

Rajesh Kumar Arora, Abhay Kumar
Flight Mechanics Division, Vikram Sarabhai Space Centre, Thiruvananthapuram

Evaluation of Pressure Error Correction by GPS Four Track Box Pattern Method for a Jet Trainer Aircraft

P Mohan Krishna Kumar,
C Suresh Kumar, K P Singh and P Jayasimha,
Hindustan Aeronautical Limited, Bangalore
Aeronautical Development Agency, Bangalore

FRIDAY, DECEMBER 11, 2009

12:30-1.15 pm : Panel Discussion Chair : Dr Prahlada, Distinguished Scientist, CC(SI), DRDO

1:15 – 1:45 pm Lunch

1:45 – 3:45 pm Sessions 9 and 10

1:45 pm

2:15 pm

2:35 pm

2:55pm

3:20 pm

3:45 - 4:00pm

SESSION 9 : CFD APPLICATIONS II

MAYFLOWER Hall

Chair: Prof. N. Balakrishnan, IISc, Bangalore

SAROD 2009-109

SAROD 2009-142

SAROD 2009-148

SAROD 2009-143

SAROD 2009-182

Invited Talk - IX
“Computational Aeroelastic Formulation for Helicopter Rotor Loads”

Store Separation Simulation Using Oct-tree Grid Based Solver

Finalizing the dimensions of a test article for High Altitude Test using CFD

Surface Temperature Prediction for Flight Vehicle using CERANS

Aero-structure spline interaction analysis using vortex lattice and finite element method

Saurabh Pandey, Bharat R Agrawal
Zeus Numerix Private Limited, Pune

Dipankar Das and Sanjoy Kumar Saha
Vikaram Sarabhai Space Center, Trivandrum

R. Balasubramanian, K. Anandhanarayanan, Vaibhav Shah, R. Krishnamurthy and Debasis Chakraborty
Defence Research and Development Laboratory, Hyderabad

A. C. Pankaj, M.S. Sudhindra and N.G. Vijaya Vittala
National Aerospace Laboratories- CSIR, Bangalore

Prof. C. Venkatesan,
Indian Institute of Technology, Kanpur

TEA

SESSION 10 : MAV DESIGN ASPECTS

GULMOHAR Hall

Chair: Mr. V. S. Chandrasekhar, ADE, Bangalore

SAROD 2009-144

SAROD 2009-162

SAROD 2009-146

SAROD 2009-147

Invited Talk - X
“Design of Endurance UAVs”

Conceptual Design and Analysis of Airframe for Fixed Wing MAV

Application of Flight Path Reconstruction and Parameter Estimation to Micro Air Vehicles

Quad-rotor based aerial vehicles for remote surveillance

Design of adaptable wing for micro air vehicle for higher endurance

Dr. A. Lurdharaj,
Aeronautical Development Establishment, Bangalore

Shashank Mishra
G. Ramesh, Sajeer Ahmed
National Aerospace Laboratories -CSIR, Bangalore

J Yogeshwaran, Shaik Ismail and A A Pashlikar,
Ramkalyan Ayyagiri
National Aerospace Laboratories, - CSIR, Bangalore, India.
National Institute of Technology, Tiruchirapalli

Duvvuri Subrahmanyam, Pavan Kumar NNVS,
Chakradhar Thantapanalli, Venkatesh Mondy
Undergraduate Students, Aerospace Engineering
Indian Institute of Technology- Madras, Chennai

Shreyas Vathul , Shashank Mishra, Prashanth Sarathy, Prakhar Jindal, Racheet Matai, Vikram Goel, Aditya Sarathy
NIT Surathkal, National Aerospace Laboratories- CSIR, Bangalore
UPES, Dehradun, VIT, Vellore

TEA

FRIDAY, DECEMBER 11, 2009				
4:00 - 6:00 pm Sessions 11 and 12				
4:00 pm	4:30 pm	4:50 pm	5:10 pm	5:30 pm
SESSION 11: HIGH SPEED FLOWS				MAYFLOWER Hall
Chair: Dr. L. Venkatakrishnan, NAL-CSIR, Bangalore				
SAROD 2009-110	SAROD 2009-180	SAROD 2009-169	SAROD 2009-165	SAROD 2009-179
Invited Talk – XI “High Speed Cavity Flows: Properties and Control” Prof. Farrukh Alvi Florida State University, USA	Development and Implementation of High Frequency Pulsed Micro actuators for Active Control of Supersonic Impinging Jet John T Solomon, Alex Wiley, Rajan Kumar, Farrukh S Alvi, Florida State University, USA	Experimental Investigation of Effect of Wire Tunnel Height on Aerodynamic Characteristics of Launch Vehicle D. K. Yadav, G. Balu, D. N. Thakur, Defence Research & Development Laboratory, Hyderabad, R. Kurade, B. Sampath Rao National Aerospace Laboratories – CSIR, Bangalore	Computational studies on the effect of Blockage on Starting / Unstarting of a Hypersonic Air intake Amit Kumar Singh, Dipankar Das, V. Ashok , B Venkat Shivaram Jadav, C.Babu Vikram Sarabhai Space Centre, ISRO, Thiruvananthapuram	Studies of Jet Flow Characteristics on Rectangular Nozzle with Square Grooves Arun Kumar P, S.B.Verma, S.Elangovan MIT, Chennai National Aerospace Laboratories - CSIR, Bangalore
SESSION 12 : LAMINAR FLOW TECHNOLOGY				GULMOHAR Hall
Chair: Mr.Vineeth Kumar, C-CADD, NAL-CSIR, Bangalore				
SAROD 2009-111	SAROD 2009-153	SAROD 2009-154	SAROD 2009-151	SAROD 2009-155
Invited Talk – XII “Natural Laminar Flow Technology: 20 Years of Piaggio P.180 Experience” Mr. Giuseppe Sacco, Piaggio Aero Industries, Italy	Empirical Evaluation of Wall Interference Effects on a Laminar Supercritical Airfoil at Transonic Speeds M. Viji, A Sathia Narayanan and Sajeer Ahmed, National Aerospace Laboratories-CSIR, Bangalore	Aerodynamic characteristics of Eppler 61 airfoil at Low Reynolds numbers P Suriyanarayanan, KT Madhavan, Shailesh Kumar and Sajeer Ahmed National Aerospace Laboratories - CSIR, Bangalore	Generalization of the Kutta-Joukowski Theorem and Its Application Partha Mondal and N. Balakrishnan Indian Institute of Science, Bangalore	Side Force On Slender Body At Large Angles Of Attack For Different Nose Shapes M. Ramakrishna, P. Kumar, S. Das and J. K. Prasad Birla Institute of Technology, Mesra, Ranchi
6:00 – 7:00 pm: Vendors Session				GULMOHAR Hall
7:15 – 8:45 pm: Cultural Event – Sponsored by L & T (Defence Nuclear and Aerospace Cluster), Bangalore				LOTUS Hall

SATURDAY, DECEMBER 12, 2009					LOTUS Hall
9:00- 9:45 am Plenary Talk 3: The Silent Aircraft and Beyond: an Industry - University Collaborative Enterprise by Prof. Edward Greitzer, MIT, USA Chair: Prof. R. Narasimha, JNCASR, Bangalore					
9:45 - 10:15 am Tea 10:15 - 12:15 pm Sessions 13 and 14					
10:15 am	10:45 am	11:05 am	11:25 am	11:45 am	12:15-1.00 pm
SESSION 13 : DESIGN and OPTIMIZATION Chair: Dr. Sathyaprakash, ADA, Bangalore					LOTUS Hall
SAROD 2009-114	SAROD 2009-171	SAROD 2009-172	SAROD 2009-173	SAROD 2009-174	LUNCH
Invited Talk - XIII “Aerodynamic Design and Analysis of Grid Fins for Missile Applications” Dr. Pakkiri Theerthamalai, DRDL, Hyderabad	Wing Optimization for Turboprops B. R. Rakshith, R. Narasimha S. M. Deshpande Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore C. Praveen, TIFR-Centre for Applicable Mathematics, Bangalore	An integrated Design Tool for Optimization of Integrally Stiffened Airframe Panels of a Hypersonic Re-entry Vehicle Krishan Kumar, Manoj Kumar T. , Prashanthan A, MK Krishnan! and S. Sirajudeen Ahamed Vikram Sarabhai Space Centre, Thiruvananthapuram	Development & Validation of ANN Based High Accuracy Aerodynamics Model for MDO of Re-entry Module Configuration Pankaj Priyadarshi, Vinod Kumar and Md Shafeeq Ahmed Vikram Sarabhai Space Centre, Thiruvananthapuram	Refining the aerodynamic data derived from wind tunnel tests for flight configuration Vinod Kumar, Pankaj Priyadarshi!, A.E. Sivaramakrishnan, George Joseph, S.V. Sharma, V. Adimurthy Vikram Sarabhai Space Centre, Thiruvananthapuram	
SESSION 14 : SPECIAL TOPICS Chair: Prof. J. Dey, IISc, Bangalore					GULMOHAR Hall
	SAROD 2009-181	SAROD 2009-149	SAROD 2009-150	SAROD 2009-160	LUNCH
Invited Talk – XIV “Investigation of Swirl Flow Dynamics using Particle Image Velocimetry” Prof. R. I. Sujith, IIT - Madras, Chennai	SMA based adaptive concepts on wings of large civil aircraft S Jaysanakar, G N Dayananda, Byji Verghese, P Senthikumar, National Aerospace Laboratories – CSIR, Bangalore	Microscale Volume Discharge for High Thrust Density Chin-Cheng Wang and Subrata Roy CPDLT, Applied Physics Research Group, University of Florida, Gainesville, USA	Effect of Unsteady Aerodynamics on Parameter Extraction Rakesh Kumar and A.K. Ghosh Indian Institute of Technology, Kanpur	Static and Free Vibration Analysis of Sandwich Plates by using Refined Plate Theory Akhilesh Kumar Jha, Prabhakaran .V, R.P.Shimpi Aeronautical Development Establishment, Bangalore	

SATURDAY, DECEMBER 12, 2009**1:00 - 3:00 pm Sessions 15 and 16**

1:00 pm

1:30 pm

1:50 pm

2:10 pm

2:30 pm

3:00-3:15pm

SESSION 15 : FLIGHT DATA ANALYSIS**LOTUS Hall**

Chair: Dr. Vijay Patel, Aeronautical Development Agency, Bangalore

SAROD 2009-112	SAROD 2009-145	SAROD 2009-160	SAROD 2009-161		
Invited Talk - XV “ Modern Fighter Aircraft Concepts, Requirements and Features ” Dr. A. K. Ghosh, ADA, Bangalore	Assessment of configuration change for a reusable launch vehicle using “Design of Experiments” and CFD G Vidya , K Manokaran, M Prasath, V R Ganesan and A E Sivaramakrishnan Vikram Sarabhai Space Centre, Thiruvananthapuram	Network Based Partial Differential Method to Extract Aerodynamic Derivatives from Flight Data A K Rajesh, M Sinha, Indian Institute of Technology, Kharagpur R Jategaonkar, DLR,Braunschweig, Germany	Analysis of Parameter Estimation from Flight Data for Various 3-2-1-1 Control Inputs Rakesh Kumar ,and A.K. Ghosh, Indian Institute of Technology, Kanpur	Confluence of various methods for evolution of aero data base of a missile configuration S.Rama, H. Govindarajan, Defence Research and Development Laboratory, Hyderabad	TEA

SESSION 16 : HYPERSONIC FLOWS - II**GULMOHAR Hall**

Chair:

SAROD 2009-113	SAROD 2009-167	SAROD 2009-168	SAROD 2009-164	SAROD 2009-166	
Invited Talk - XVI “ Role of Flow Kinematic and Energetic Effects in Hypersonic Flow Control ” Prof. G. Jagadeesh, IISc, Bangalore	Aerodynamic feasibility study for a Long Range Supersonic Cruise Missile Munish Kumar Ralh, J. Umakant and P. Theerthamalai Defence Research Development Laboratory, Hyderabad	Experimental Investigation of Total Drag for a Blunt Cone in Aero Ballistic Range Prakash S, Shanmugam V, Sandip Chattopadhyay Defence Research and Development Laboratory, Hyderabad	Thermal response analysis of scramjet combustor wall to high speed turbulent reacting flow M S R Chandra Murty R D Misal and Debasis Chakraborty Defence Research and Development Laboratory Hyderabad	Three-dimensional shock / turbulent boundary layer interaction in a simulated scramjet inlet V Pawar, N Rane and K Sinha Indian Institute of Technology- Bombay, Mumbai	TEA

SATURDAY, December 12, 2009

3:15 – 5:15 PM Sessions 17 and 18

3:15 pm

3:45 pm

4.05 pm

4:25 pm

4:45 pm

5:15 – 5:30 pm

SESSION 17 : MAV / UAV APPLICATIONS

LOTUS Hall

Chair: Dr. G. Ramesh, NAL-CSIR, Bangalore

SAROD 2009-115	SAROD 2009-156	SAROD 2009-157	SAROD 2009-158	SAROD 2009-159	TEA
Invited Talk –XVII “A parameter study of New Lift Generation Mechanism in Flapping Flight : Experiments and Numerical Simulations” Dr. K.R.Sreenivas, JNCASR, Bangalore	Numerical Investigation of flow past two rotating propellers in the presence of UAV flow-field P Srinivasa Murthy and Amarjit Singh Defence Research and Development Organisation Bangalore	Design and Performance Evaluation of a Propeller for Micro-Air Vehicle Application Balaji Jayanth V, M D Deshpande and Abdul Nassar M. S. Ramaiah School of Advanced Studies, Bangalore	Optimized Construction of a Composite MAV wing using CFD Analysis D Thulasi Durai, S R Viswamurthy, Byji Varughese, G N Dayananda, M B Subrahmanya, D S Kulkarni, B N Rajani and J S Mathur National Aerospace Laboratories - CSIR, Bangalore	Reliability of RANS Computations for Flow past an Aerofoil at Low Re D S Kulkarni, M B Subrahmanya and B N Rajani National Aerospace Laboratories - CSIR, Bangalore	

SESSION 18: INVESTIGATIVE AERODYNAMICS

GULMOHAR Hall

Chair: Dr. G. K. Suryanarayana, NAL-CSIR, Bangalore

SAROD 2009-106	SAROD 2009-175	SAROD 2009-176	SAROD 2009-177	SAROD 2009-178	TEA
Invited Talk – XVIII “Studies on Advanced Rocket Nozzles” Dr. S. B. Verma, National Aerospace Laboratories - CSIR, Bangalore	Experimental and Computational studies Over a Blunt Double Delta Wing J.Sreenivasulu, S. K. Epuri, P.Kumar, S. Das and J. K. Prasad Vikram Sarabhai Space Centre, Thiruvananthapuram	Oil flow visualization over generic winged body configuration M Prasath, P Balasubramanian, V R Ganesan, A. E. Sivaramakrishnan Vikram Sarabhai Space Centre, Thiruvananthapuram N Gopinath, National Aerospace Laboratories - CSIR, Bangalore	Study of flow unsteadiness in a bifurcated Y-Shaped duct for a typical combat aircraft model Bikshapathi M, Karthik N, Buddhadeb Nath, Gopinath P. R, National Aerospace Laboratories,-CSIR, Bangalore S.R.Mohan and D. Koner Aeronautical Development Agency, Bangalore	Near Field Studies of an Elliptic Jet in a Co flow Ramesh G, Suriyanarayanan P, Sudhakar S, National Aerospace Laboratories – CSIR , Bangalore	