

**NATIONAL WORKSHOP ON
SHOCK AND BLAST WAVE RESEARCH IN INDIA:
THE PAST, PRESENT, AND FUTURE (NWSBRI-2017)**

October 12-13, 2017

Venue: CSIR-Central Mechanical Engineering Research Institute,
Durgapur- 713 209, West Bengal, India

DELEGATES REGISTRATION FORM

Dear Sir,

Kindly register the following names for the NATIONAL WORKSHOP ON SHOCK AND BLAST WAVE RELATED RESEARCH IN INDIA: THE PAST, PRESENT, AND FUTURE (NWSBRI-2017) to be held during October 12-13, 2017 at CSIR-CMERI, Durgapur, India.

Name (in Block letters):

Name of the Organization:

Designation:

Address:

Phone:

Fax:

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Food: Veg./Non veg:

Details of Registration Fees:

Option 1. By Demand draft, drawn in favour of

CMERI JUBILEE, payable at Durgapur

Option 2. Bank Transfer

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A/C Name: CMERI JUBILEE

A/c No: 20270985953

IFS Code: ALLA0211764

Branch Name: Durgapur City Centre

Date:..... Sign:.....

Note: Delegates/Accompanying Persons will not be regarded as registered until the payment is received.
[Photocopy of this form may be used for more participants]

Important Date

Registration Deadline: 8th September 2017

The delegates are requested to intimate at "nwsbri2017@gmail.com" before registering for the workshop since the number of participants is limited.

Topics to be covered

- ❖ The contribution of shock wave research at IISc Bangalore to defense, industry, and societal sectors.
- ❖ Lessons learned during installation and commissioning of indigenously designed Combustion driven shock tunnel at ISRO.
- ❖ Progress in non-intrusive tools for measuring pressure, velocity, density, unsteady pressures, and surface shear stress.
- ❖ The lessons learned during the process of designing a scramjet engine flow path utilizing shock waves at DRDL Hyderabad.
- ❖ An Overview of blast wave related activities at TBRL Chandigarh.
- ❖ Simple schemes of modeling blast waves and the factors influencing the mitigation of the air-blast.
- ❖ Blast wave mitigation methodologies and blast wave attenuation techniques used in TBRL Chandigarh.
- ❖ The thrust areas of research and shock/blast wave studies at CSIR-CMERI Durgapur

Registration Fees

Delegates from Industries	: ₹ 5000/-
Academia & R&D Institutes	: ₹ 4000/-
Student delegates	: ₹ 2000/-
Accompanying Persons	: ₹ 1000/-

ORGANISING COMMITTEE

Patron: Dr. Harish Hirani, Director, CSIR-CMERI
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Chairperson: Dr. P. K. Chatterjee, Chief Scientist

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Joint Convener: Dr. Sudipta De, Dr. B. Choudhury

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**Venue : CSIR-CMERI,
M.G. Avenue, Durgapur- 713209**

Theme:
**Create an awareness among researchers and academicians
for the need based research for strategic sector**



**CSIR - Central Mechanical Engineering
Research Institute, Durgapur, 713209, WB, India**

About CSIR-CMERI

The CSIR-Central Mechanical Engineering Research Institute (CSIR-CMERI) is the only National Laboratory in India carrying out research in the field of Mechanical Engineering. As a constituent member under the Council of Scientific & Industrial Research, the R & D activities of CMERI extends over mechanical and allied engineering fields. CSIR-CMERI has been engaged in research on modern technological areas like Aerosystems developments, External aerodynamics, Blast wave simulation and its attenuation, Energy Research and plasma gasification, Fluidized bed combustion technologies, Surface and under water robotic systems, Condition monitoring and Industrial maintenance, NDT and Metallurgy, Advanced Manufacturing, Micro system technologies, Surface Engineering & Tribology, Functional and Smart Materials, etc. It is also enriched with highly talented young scientists who work in a wide spectrum of interdisciplinary activities for design, detailed analysis, development, and manufacturing of mechanical systems.



Objectives of the workshop

The motivation of this workshop is to bring together participants from industries, R&D organizations and academic institutions to push for the need based research and product development for the strategic, industrial and societal sector by exchanging and sharing their research experiences.

Details of the Invited speakers

Prof. Gopalan Jagadeesh, founder secretary of Society for Shock Wave Research India
Title: Enchanting Waves



Dr. G. Jagadeesh is a Professor in the Department of Aerospace Engineering, IISc Bangalore. He is the Founder of Centre of Excellence in Hypersonics at IISc. He is also an honorary professor in the School of Engineering, University of Glasgow, UK. His research areas include Hypersonic Aerothermodynamics and shock wave propagation in complex fluids. He has published over 200 papers in International Journals, and TWENTY PATENTS related to Shock Waves and hypersonic flow control.

ABSTRACT:

A number of methodologies/facilities to generate shock waves of requisite strength have been indigenously designed and built in the Laboratory for Hypersonic and Shockwave Research (LHSR) in (IISc), Bangalore. Novel techniques such as retractable aero-spikes, smart coatings, forward facing jets, and concentrated energy deposition have been developed for reducing the aerodynamic drag around vehicles flying at hypersonic speeds. Innovative devices to recreate large scale blasts within the confines of the laboratory have also been developed. A broad overview of the recent research and technology development activities in LHSR will be presented in this talk.

Prof. K. Ramamurthi, Chairman, ARMREB Panel of DRDO
TITLE: Modeling of Blast Wave and the Mitigation of Damage from Blast



Dr. Ramamurthi was a Deputy Director in ISRO and worked in solid and liquid propellant rockets and spacecraft propulsion before joining IIT Madras in 2005. He obtained Ph.D from McGill University, Montreal in Mechanical Engineering. His interests are in Propulsion, Combustion, Thermodynamics, and Shock waves and he continues to interact with institutions in the country on teaching these subjects.

ABSTRACT:

The peak overpressure (PoP) and impulse generated by a blast wave need to be known in order to determine its damage potential. The predictions of PoP and impulse are influenced by the geometry and non-ideality of the blast wave since the energy driving the blast is released over a finite time and over a finite volume. Simple schemes of modeling blast waves and the factors, such as impedance mismatch at the interfaces and yielding of surfaces, which influence the mitigation of the air-blast will be discussed.

Dr. L.Venkatakrishnan, Head, Experimental aerodynamics, CSIR-NAL

TITLE: Beyond Merely Seeing: Quantitative Non Intrinsic Diagnostics for Understanding Flows



Dr. L. Venkatakrishnan is a Chief Scientist and currently the head of Experimental Aerodynamics Division at National Aerospace Laboratories.

He obtained his Ph.D in Aerospace Engineering at the Indian Institute of Science in 1997 and worked at Florida State University as a Post-Doctoral Fellow before joining NAL in 2000. He has published about 80 articles in international journals and conferences. He has recently developed an indigenous, cost-effective system to determine the location of bullets fired at a target which is being used by both Indian Army and the Indian Air Force.

ABSTRACT:

Over the last decade, non-intrusive measurements have established themselves as the preferred tools in wind tunnels. At CSIR-NAL, a significant progress has been made in the development and application of these tools for pressure, velocity, and density measurements. The quality and resolution of data available from such measurements allow for detailed comparison with the results of numerical calculations. This has the potential to change the organization of wind tunnel testing activity to an interactive format from a static top-down version. The planning of facilities and tests to fully utilize these techniques will be discussed along with progress in new techniques for unsteady pressures, and surface shear stress measurements.

Shri. K. Srinivasan, Engineer, VSSC/ ISRO

TITLE: Shock wave for aerothermodynamics characterization of ISRO's vehicles



Shri. K. Srinivasan is currently heading the 1m shock tunnel facility at VSSC, Trivandrum. He was responsible for design and realization of the 1m combustion-driven shock tunnel at VSSC. He obtained his M. Tech in Aerospace Engineering from IIT, Kharagpur and joined in ISRO in 2002. He has published 23 conference papers and 4 International journal papers.

ABSTRACT:

Shock tubes are used primarily for aerothermodynamic characterization of re-entry vehicles, air-breathing propulsion system's intakes, etc. by constructively utilizing the potential of the shock waves. The use of shock wave in ISRO for aerothermodynamic characterization started on the need to characterize the heat flux on the ascending SLV-3 / PSLV heat shields and for the TPS design/optimization. A 1m combustion-driven shock tunnel has been indigenously designed and commissioned at VSSC to meet ISRO's future requirements. Problems faced during tunnel operation like detonation, shock wave attenuation, reflected shock boundary layer interaction, starting shock deflection in dump tank, etc., and the lessons learned will be presented. The key aspects in the successful demonstration of Supersonic combustion on a practical configuration will be brought out.

Dr. V. Thiagarajan, DRDL, Hyderabad

TITLE: Design of Intake for Hypersonic Air-Breathing Engine: Lesson Learnt



Dr. V. Thiagarajan is the Deputy Project Director of SAM missile project. He worked on various strategic and tactical missiles development and established the design methodology of air-intake for the hypersonic air-breathing vehicle.

He obtained his B. Tech in Aeronautical Engineering from MIT, Chennai in 1990 and M.E degree in Aerospace Engineering from IISc, Bengaluru in 1992. He has received his Ph.D. degree in Aerospace Engineering from IIT, Kanpur in 2007. He joined DRDL, Hyderabad in 1992.

ABSTRACT:

The shockwaves are exploited to compress the airflow by placing shocks at the appropriate places on the physical flow path in the air-breathing engine intakes. Compressing the freestream flow to the level which will be compatible with ramjet or scramjet combustor is possible only through shockwave. The lessons learned during the process of designing a scramjet engine flow path utilizing shock waves will be presented in the workshop.

Shri. Inderpal Singh Sandhu, Divisional Head BDS, TBRL Chandigarh

TITLE: Blast : Damage and mitigation methodologies



Shri. Inderpal Singh Sandhu is the Divisional Head of Blast & Damage Studies Division. He Worked in many projects related to development of improved explosive storage houses, mine protective vehicles, and protective structures.

He has 15 years of working experience in studies related to blast and associated damage, shock/blast mitigation, and evaluation of different protective systems against blast. He has successfully established shock tube facility in TBRL for doing basic and applied research on blast-structure interaction and blast mitigation. He has published 10 papers in national & international conferences and journals.

ABSTRACT:

Blast wave can create a destructive effect on the surrounding environment due to its sharp rise in the peak over pressure. A spontaneous rapid strain resulting from the blast wave produce blast-induced traumatic brain injuries and can damage most of the structures. Many blast wave attenuation techniques have been proposed to reduce the destructive effect of blast waves on targets. An overview of blast wave mitigation methodologies and blast wave attenuation techniques used in TBRL Chandigarh will be discussed in the talk. The overall activities of the TBRL Chandigarh are will also be delivered in the seminar.



Dr. Nagahanumaiah, Head PPD, CSIR-CMERI

TITLE: Overview Research activities at CSIR-CMERI

Dr. Nagahanumaiah is a Sr. Principal Scientist and Head of Micro Systems Technology Laboratory and PPD, CSIR-CMERI, Durgapur. He is a recipient of 'BOYSCAST Fellowship' and 'Raman Fellowship'. He has established MST group in 2006 and developed the working prototypes of Micro-EDM, Laser processing and Reconfigurable micro factory. His areas of research include micro-nano systems engineering, modular micro machines development, and micro-nano manufacturing. He has published 82 research papers in refereed journals and conferences.

ABSTRACT:

Dr. Nagahanumaiah will deliver the overview of the research activities at CSIR-CMERI, Durgapur.

Dr. T. Murugan, Scientist CSIR-CMERI

TITLE: Manipulation of shock tube to generate blast wave for blast wave attenuation studies



Dr. T. Murugan is a Scientist in Energy Research and Technology Group since 2010. He obtained his PhD in Aerospace Engineering from IIT Kanpur in 2009. His interests are experimental aerodynamics, flow control, Impulsive flows, shock and blast wave interactions, and computational fluid dynamics. He has published 20 peer-reviewed articles and 20 international conference papers.

ABSTRACT:

Short driver section shock tubes are used for producing the blast wave in the laboratory. Methods to manipulate the peak overpressure, Friedlander profile and impulse will be discussed in the talk along with the interaction of blast wave with generic objects.

Shri. Amit Kumar, Scientist, CSIR-CMERI

TITLE: Thermal shock waves in beam interceptive devices at Facility for Anti-proton and Ion Research (FAIR)



Shri. Amit Kumar is a Scientist in Advanced Design and Analysis Group since 2010. He received his M. Tech in Engineering Mechanics and is pursuing PhD in wave modelling from IIT Delhi. His interests are thermal shock and guided waves in solids, Extended and higher order FEM for wave modelling and Smart composites.

ABSTRACT:

The Beam Stoppers, being designed by CSIR-CMERI for the upcoming FAIR at Darmstadt, are subjected to the accelerated primary heavy ion beam of energy 1.5 GeV/u and order of 5×10^{11} particles per spill, deposited within 50 ns, causing the thermal shock waves to be generated and propagated within the absorber material. The results of the computational studies done on the thermal shock wave problem will be presented in the talk.

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Date: Sign:

For registration and other details

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Location:

CSIR-CMERI is about 10 km from Durgapur Railway station and near Grand Trunk Road, well connected by buses, Taxis and three wheelers. Durgapur is about 160 km from Howrah railway station on Howrah-Delhi route. It is 175 km from Kolkata airport. People coming from Delhi can also avail Zoom Airlines flights to Durgapur Kazi Nazrul Islam Airport.

Places of interest in Durgapur:

1. City centre

The place is the cosmopolitan arcade of the city. Malls, shopping centers, movie halls, eating joints etc. are scattered.

2. Durgapur Barrage

One of the prime attractions of the city, the barrage is built to control the overflowing Damodar River in the monsoons.

3. Deul Park

The park is a perfect hideaway from the city. The park is bordered by Ajoy River and is frequented by flocks of elephants. It has been commercialized to accommodate a few water rides, a resort, lawns for picnics etc.

4. Kumaramangalam Park

The park is one of the biggest in the region with Musical fountains and Boating facilities.

5. Ram Mandir

This temple is dedicated to Lord Ram, sits in the middle of a large garden. It's made of stone carved walls and is known as the most beautiful temple of Durgapur.

6. Anand Amusement Park

Anand Park provides wholesome outdoor recreation for the family with a view of attracting tourism to this fast growing industrial belt. It has a complete eco-friendly atmosphere with thrilling rides, eateries, soothing landscaping, boating & water sports facilities and is managed by a professional team maintaining optimum safety norms.

Hotels in Durgapur:

Durgapur is an industrial and educational city having standard and affordable hotels, lodges and guesthouses. The following are the notable hotels close to CSIR-CMERI main office where the workshop will be held. 1. Citi Residenci, 2. Peerless Sarovar Portico, 3. Park Prime Durgapur, 4. Hotel Banerjee Inn, 5. Hotel Steel Regency, 6. Hotel Luxor.

Tourist attraction around Durgapur:

1. Santiniketan

Santiniketan is a small town near Bolpur and approximately 57 km from Durgapur. It was established by Maharshi Devendranath Tagore, and later expanded by his son Rabindranath Tagore whose vision became what is now a university town, Visva-Bharati University. Social and cultural events take place here throughout the year. These include Basanta Utsav, Barsha Mangal, Sharodutsav, Nandan Mela, Poush Mela, Magh Mela, Rabindra Jayanti to name a few. There is a Deer Park 3 km from Santiniketan.

2. Bishnupur

Bishnupur (the distance from Durgapur is 80 km) was ruled under the Gupta period by local Hindu kings who paid tribute to Samudra Gupta. Bishnupur is famous for its terracotta temples Malla Shree Krishna Raslilla and the Baluchari sarees. The temples of Bishnupur is on UNESCO World Heritage Site's Tentative list.

3. Maithon and Panchet Dams

The Maithon Dam (80 km from Durgapur) was specially designed for flood control and generates 60,000 kW of electric power. There is an underground power station, the first of its kind in the whole of South East Asia. This lake is spread over 65 square kilometers. Panchet Dam (73 km from Durgapur) was the last of the four multi-purpose dams included in the first phase of the Damodar Valley Corporation. The reservoir taps a catchment area of 10,961 square kilometers.

4. Kamarpukur and Jayrambati

Kamarpukur (120 km from Durgapur) is famous for being the birthplace of Ramakrishna, where the signs of ancient prosperity are still visible everywhere. Jayrambati (5 km from Kamarpukur) is the birthplace of Sarada Devi. This village with its sacred traditions has become a holy place of pilgrimage among followers of Sri Ramakrishna.

5. Mukutmanipur

Mukutmanipur is located at the confluence of the Kangsabati and Kumari rivers (95 km from Durgapur). Green forests surround the vast bluish tract of water, and the hillocks are picturesque. It is very famous for its superb natural beauty. Approximately 2 km from the lake is the Bangopalpur Reserve Forest, a home of many species of flora and fauna.

6. Bodh Gaya

Bodh Gaya (300 km from Durgapur) is a religious site and place of pilgrimage associated with the Mahabodhi Temple. It is famous as it is the place where Gautama Buddha is said to have obtained Enlightenment.

7. Hill stations

Darjeeling (530 km from Durgapur) is located in the Lesser Himalayas at an elevation of 6,700 ft. It is noted for its tea industry, its spectacular views of the Kanchenjunga, the world's third-highest mountain, and the Darjeeling Himalayan Railway, a UNESCO World Heritage Site. Darjeeling had become an important tourist destination, and It is reported to be the only location in eastern India that witnesses large numbers of foreign tourists

Gangtok (590 km from Durgapur) is located in the eastern Himalayan range, at an elevation of 5,410 ft. The town's population belongs to different ethnicities such as Nepalis, Lepchas, and Bhutias. The city is flanked on east and west by two streams, namely Roro Chu and Ranikhola, respectively. There are densely forested regions around Gangtok, consisting of temperate, deciduous forests of poplar, birch, oak, and elm, as well as evergreen, coniferous trees of the wet alpine zone.

