Politecnico di Torino
Dipartimento di Ingegneria Meccanica e Aerospaziale

RMIT UNIVERSITY

Corso di Dottorato di Ricerca in Ing. Aerospaziale

Venerdì 17 Marzo 2023

CONFERENZA

ADVANCED MULTIFUNCTIONAL MATERIALS AND STRUCTURES - ANALYSING EXTREME DEFORMATION AND DYNAMIC BEHAVIOUR USING MESHLESS AND MULTISCALE METHODS

Prof. Raj Das - Dept. of Aerospace Eng. - RMIT University, Melbourne, Australia

ore 10.30 - Sala Ferrari, II piano DIMEAS, C. Einaudi 40.

Abstract: The seminar will present overview of advanced multifunctional materials and structures, and computational mechanics research at the Centre for Multifunctional and Composite Materials of RMIT University, Australia. Our research covers both fundamental and applied aspects of material behaviour and failure processes. This presentation will encompass computational modelling of material deformation, damage and fracture using multi-scale techniques in conjunction with mesh-less methods, novel composite materials development and damage tolerance structural optimisation.

Multi-scale modelling of damage and fracture progression linking nano to macro scales and associated development of coupled computational modelling tools will be highlighted. The strengths of mesh-less methods will be illustrated with reference to both low to high-speed impact induced fractures and small to large scale problems. These include several dynamic fracture and fragmentation processes, such as hypervelocity impact fracture, nano-scale machining, large scale geo-mechanical failures (magma intrusion, caving, slope stability, etc).

One of our core areas to be presented is novel impact and blast resistant, light weight composite material developments for aerospace components subjected to high-speed loading and extreme deformations, as occurs in the cases of debris impact on spacecrafts, bird strike on aircraft engines, blast induced failures, etc. Lastly novel shape and topology optimisation methodologies for damage tolerance optimisation, i.e. maximising the residual strength and fatigue life, of aero-structures will be highlighted. Case studies from projects will be presented to demonstrate the practical implementation and utilities of the developed design and analysis methodologies.

Tutte le persone interessate sono cordialmente invitate a partecipare!

(per informazioni, rivolgersi Proff. E. Cestino: 0110906818 G. Frulla: 0110906842)

Per esigenze di carattere organizzativo: R.S.V.P**. entro il 13 Marzo 2023**.

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Biography:

Prof Raj Das is the Full Professor of Applied Mechanics and leads the "Simulation of Advanced Materials and Structures (SAMS)" research group in the 'Sir Lawrence Wackett Defence and Aerospace Centre' of RMIT University (Australia). He is the 'Program Director' in the Aerospace Engineering and Aviation discipline of the School of Engineering. He is also an honorary academic in the University of Auckland, New Zealand and the University of Quebec, Canada.

Prof Das has nearly 20 years of experience in the design, analysis and optimisation of engineering materials and structures with a focus on computational mechanics, structural optimisation, composite structures, failure analysis, and damage tolerance design. Prof Das has published more than 300 papers in international journals and conferences in collaboration with several universities, institutes and industries. Prof Das has a PhD from Monash University, Australia in Applied Mechanics, and has previously worked in the University of Auckland (New Zealand), the Commonwealth Scientific and Industrial Research Organisation (Australia), and the University of Manchester (UK).

Prof Das is associated with various scientific and technical societies broadly related to Theoretical and Applied Mechanics. He is currently the President of the *'International Congress on Mechanical Behaviour of Materials (ICM)*' and represents Australia as a 'Director' in the Executive Committee of the *'International Congress on Fracture (ICF)'*. He is also the Chair of the '*Australia Section of the American Society of Mechanical Engineers*'. Within Australia, Prof Das serves as the Chair of the '*National Committee on Applied Mechanics*' and in the executive committee of the 'National Committee on Space Engineering' of Engineers Australia. Prof Das has been elected as a 'Fellow' of Engineers Australia (FIEAust). He has chaired/co-chaired several well-known conferences (ICM-13, ACAM-8, ACCM-3, ICCM-6, etc). Prof Das has been granted several national and international awards and fellowships, including the "*Science Award*" by the Sustainable Aviation and Energy Research Society, '*RMIT Team Award for Impact and Collaboration* as part of the Multifunctional Composite Materials Group, '*Computational Methods Award*' by ICCM, '*Jim & Hazel D. Lord Emerging Faculty Fellowship*', '*Research Excellence Award'*, and '*AUEA Emerging Researcher Award*' by the University of Auckland. He has received the '*CONICYT award*' from the Government of Chile, '*Certificate of Merit Award*' from the International Association of Engineers, Hong Kong, '*UQAC Visiting Fellowship*' from the University of Quebec, Canada, and '*Visiting Researcher Fellowships*' from the Sapienza University, Italy and the University of Cape Town, South Africa.