Preface

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Biographical notes: Prasad Vegendla is a Nuclear Engineer at Argonne National Laboratory, Lemont, USA. His main research focus is on vehicle energy efficiency, multi-scale and multi-physics reactive flow modelling. He holds a PhD in Chemical Engineering from the University of Gent, Belgium. He obtained his Bachelor's degree from Indian Institute of Chemical Engineers, Kolkata, India and Master's degree in Chemical Engineering from Indian Institute of Technology (IIT), Chennai, India. He has published over 30 journal papers and technical reports.

Sivakumar Palanivelu working as an Assistant General Manager for Engineering Research Center of TATA Motors in India. He completed his PhD from Ghent University from Belgium, Europe and graduate study from Indian Institute of Technology, Madras, Chennai. His current responsibility includes developing and integrating advanced technologies on advanced safety, fuel economy improvement, connectivity and light weighting for Tata vehicles. Furthermore, he is also heading a simulation team which involves model based design for vehicle systems, power train optimisation performance and fuel economy and vehicle dynamics. He has published 58 publications including peer reviewed journals and conference proceedings.

This special issue on 'Ground vehicles: aerodynamics/thermal modelling, design and optimisation', brings together a selection of insightful papers that addresses some of the problems related to vehicle modelling and simulations.

This issue mainly focuses on mathematical modelling of thermal flows including aerodynamic effects. The computational fluid dynamic (CFD) modelling and numerical simulations help to optimise the aerodynamics and thermal performance of vehicles. A wide range of numerical parameter (Pr, Sc, etc.) studies provide detailed information on aerodynamics and thermal analysis of the fluid flow.

This volume includes five manuscripts. This special editorial is arranged in the following order.

1 Marco Evangelos Biancolini, Carlo Del Bene, Torbjörn Larsson and Corrado Groth, 'Evaluation of go-kart aerodynamic efficiency using CFD, RBF mesh morphing and lap time simulation'

2 Nan Chen, Fanglin Wang, Ruifeng Hu, Nepal C. Roy and Md. Anwar Hossain, 'Transient flow of viscous compressible fluid past a heated cylinder'

3 Idiris Mehamud and Bandi Ramanjulu, 'Calibration of single cylinder four stroke computer control engine by changing inlet manifold dimensions with bio-based tri-fuel'

4 G. Naresh, K. Raja, B.P.V. Sai Krishna Mukherji, I.N. Niranjan Kumar and V. NagaBhushana Rao, 'An investigation and comparative analysis on marine gas turbine rotor blade with cooling holes using FEA'

5 Devarapu Anilkumar, Prabal Datta and Bishun D. Pandey, 'Mixed convection flow over a slender cylinder due to the combined effects of thermal and mass diffusion'

The first paper discusses aerodynamic performance analysis for various external surfaces of go-kart vehicles using morphing solver. It demonstrates the effectiveness of CFD, radial basis function (RBF) mesh morphing and lap time simulation to evaluate go-kart aerodynamics and to estimate its effects on track performance. It concludes stating that the aerodynamic losses play an important role on the performance, even at low travelling speeds that are typical for a go-kart vehicle. Major contribution of this paper is finding the reduction in drag by 4.3% when one of the driver is exposed to the flow with a smaller driver as compared with a standard driver represented in the baseline model.

The second paper discusses the effect of boundary layer on enthalpy transfer over a cylindrical surface. It uses finite difference method to numerically solve the formulated governing equations. This paper discusses the effect of Mach number and surface temperature parameter on the numerically analysed solution and these findings can help to improve the predication of heat transfer and aerodynamics with boundary layer effects.

The third paper discusses the performance variations and emissions of the single cylinder of internal thread-intake port diesel engine under both steady-state and motored engine conditions using bio-based tri fuels (diesel, turpentine blend and acetylene gas). It analyses performance of a tri-fuel experimentally with diesel and turpentine blend as primary fuel and acetylene inducted as secondary gaseous fuel. This paper concludes that the blend and the acetylene gas flow rate of three litres per minute (through a gas flow meter) offered higher brake thermal efficiency up to 3% than that of diesel baseline operation.

The fourth paper shows a gas turbine technology implementation to extract the maximum energy from high temperature and high pressure gases by improving the thermal efficiency of the gas turbine engine. This paper ensures safe and reliable working of the turbines, an effective cooling system to reduce the blade metal temperature to acceptable levels. It shows development of four different models consisting of a solid blade and three blade models with varying number of holes and analyses their structural as well as thermal performance. This paper concludes that the stresses induced in both materials (INCONEL X-750 of and NIMONIC-105) were within the acceptable limit (yield strength). Moreover, maximum stresses were observed at the root section of the blade minimum stresses were observed in the portion of blade root.

Finally, paper five deals with the similarity solution of double-diffusive mixed convection flow over a vertical slender cylinder due to the combined effects of thermal and mass diffusion. The local similarity method has been implemented for transformation of nonlinear partial differential equations to ordinary partial differential equations. Numerical solution of system of nonlinear ordinary differential equations was derived using an implicit finite difference scheme along with quasilinearisation technique. The main findings of this paper were as follows:

1 strong effect of buoyancy parameter on the flow and thermal field

2 strong influence of Prandtl number (Pr) and Sherwood number (Sc) on heat transfer and mass transfer, respectively.

As you read throughout this volume of *IJAD*, I would like to remind you that the success of our special issue depends directly on the number of quality articles submitted for review. We would like to thank all authors for their contributions to the special issue and reviewers for their time and constructive feedback to authors. We would like to express our gratitude to the Editor-in-Chief, Dr. Mohammed Dorgham for the opportunity to edit this special issue. Our appreciation as well to the support received by the journal managerial team.