



Plenary Session

Prof. Marcelo de Lemos

“Confronting the Modern Life Trilemma: Energy, Food and the Environment”

Abstract:

Nowadays, food production, energy engineering and environment protection poses a “trilemma” to human society as one activity may heavily affect the other two. Use of extensive areas for agricultural and animal protein production consumes large amounts of fresh water and are in some cases the result of deforestation of rainforests in tropical areas. Biomass production poses the critical question whether land should be primarily used for biofuel production, mostly used by upper layers of society, or food, mainly needed at lower prices for low-income populations. This talk is devoted to presenting a general picture of the impact of energy and food production on human life and the environment, particularly since the industrial revolution in the 18th century. Special focus will be devoted in reviewing energy and biofuel production and their impact on the environment.

Short Bio:

Prof. de Lemos obtained his Bachelor and MSc degrees in Mechanical Engineering from the Pontifical Catholic University of Rio de Janeiro (PUC-RJ) in 1977 and 1979, respectively. In early 1983, he obtained his PhD degree from Purdue University, USA. He spent a year as Assistant Professor at PUC-RJ in 1984, followed by two years as Resident Associate at Argonne National Laboratory, Illinois. In 1986, he joined the Aeronautical Institute of Technology - ITA in São José dos Campos, Brazil. He is Full Professor at ITA, founder and head of the Computational Transport Phenomena Laboratory -LCFT and the newly established Competence Center for Energy – CCE. He also serves as Head of the Department of Energy. From 1991 to 1992, he was Visiting Scholar at Ruhr-Universität-Bochum, Germany. In early 1992, he became a Member of the American Society of Mechanical Engineers -ASME and in 2009 he was promoted to the "Fellow" grade. He is also an “Associate Fellow” of the American Institute of Aeronautics & Astronautics - AIAA. He has advised 11 PhD and 30 MSc students. Prof. de Lemos has set a new mathematical framework for novel treatment of turbulent flow, heat, and mass transfer through permeable media. Overall, he has published



more than 370 articles in conference proceedings and journals in addition to ten book chapters and five books. Prof. de Lemos' research interests involve computational thermo-fluid dynamics, transport phenomena, porous media, thermal engineering, aerodynamics, gas turbines, advanced fossil and renewable energy systems (wind, solar, biomass), high performance computing, turbulent reactive flow, computational mathematics, combustion dynamics, modeling and simulation of thermochemical systems, fuel cells, gasification processes and CO₂ capture and storage technologies.