Michael Z Podowski, J Aeronaut Aerospace Eng 2017, 6:3 (Suppl)
DOI: 10.4172/2168-9792-C1-018

Michael Z Podowski

Rensselaer Polytechnic Institute, USA

On the modeling and computer simulation of multiphase flow and heat transfer in thermal systems

Unlike single-phase flows, where the main factor behind the quality of computer simulations, with some notable exceptions, is mainly associated with numerical issues, two- or multiphase problems introduce a whole spectrum of additional questions, including but not limited to the: consistency of formulation of both individual models of interfacial phenomena and of the combined interconnected models, impact of differences between the modeling approaches used for multiphase fluid mechanics and for heat transfer, impact of fluid property models, needs to accommodate mechanisms of different scales (both spatial and temporal) into single computational models, numerical stability and convergence, criteria for assessing the correctness of computational grid selection (which may be quite different from those for single-phase flows), and criteria to quantify modeling vs. computational uncertainties. The objective of this lecture is to present an overview of the issues mentioned above, and to discuss recommended solutions based on lessons learned to date. Fluid-mechanics models of multiphase flow will be discussed first, followed by heat transfer with phase change (including both boiling and condensation). The impact of coupling between these two groups of models will also be addressed.

Biography

Michael Z Podowski is a Professor of Nuclear Engineering and Engineering Physics in the Department of Mechanical, Aerospace and Nuclear Engineering at Rensselaer Polytechnic Institute, and the Director of Center for Multiphase Research. His research interests include fundamentals and applications of multiphase flow and heat transfer, computational multiphase flow dynamics (CMFD), supercritical-pressure turbomachinery and systems, dynamics and stability of multiphase systems and nuclear reactor thermal-hydraulics and safety. He has over 350 technical publications, including 7 books/book-chapters and more than 60 journal papers. He is Fellow of American Nuclear Society (ANS) and recipient of the 2014 ANS Compton Award.

podowm@rpi.edu