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Aida Bulucea

Recent Advances in Energy, Environment and Financial Science

- Proceedings of the 12th International Conference on Energy, Environment, Ecosystems and Sustainable Development (EEESD '16)
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Plenary Lecture 1

Structuring Environmental Models by Means of Dimensional Analysis

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Abstract: Dimensional Analysis (DA) is a method for describing the function of a physical system in terms of the necessary independent variables, parameters, and coefficients (VPCs), arranged in a form that remains basically unchanged when the magnitude of the system increases or decreases (scale up or down, respectively). The environmental models simulate the behavior of large systems met in Nature, and are complex, since they include VPCs at different phenomenological levels, from simple/empirical to advanced/scientific ones. In the present work DA is used for structuring such models by arranging the VPCs in dimensionless groups. For this purpose, a methodological framework under the form of an algorithmic procedure has been designed/developed and implemented in two waterbody pollution cases. The innovative technique used in that procedure is a combination of system decomposition/ recomposition and model based reasoning (MBR) derived through case based reasoning (CBR) by induction. The results of the implementation are (i) presented by means of ontological mapping and (ii) evaluated/discussed by means of sensitivity/robustness analysis.

Brief Biography of the Speaker: Prof. Fragiskos Batzias holds a 5years Diploma and a PhD degree in Chemical Engineering, and a BSc in Economics. He has also studied Mathematics and Philosophy. He designed/developed the Laboratory of Simulation of Industrial Processes and the Research Group on Systems Analysis at the Department of Industrial Management and Technology of the University of Piraeus, Greece. He is teaching at the postgraduate courses (i) Systems of Energy Management and Protection of the Environment, running by the University of Piraeus, and (ii) Techno-Economic Systems, running by the Electr. & Comp. Eng. Dept. of the Nat. Tech. Univ. of Athens in cooperation with the University of Athens and the University of Piraeus. His research interests are in chemical engineering systems analysis and knowledge based decision making. He has >100 publications in highly ranked journals and conference proceedings, including 29 research monographs in collective volumes, with 652 citations and an h-index of 13 (Scopus). He has participated (and chaired after invitation from the organizers) in prestigious international conferences, such as those organized periodically by the IEEE, the European Federation of Chemical Engineering (EFCE), the DECHEMA, CHISA, WSEAS Organizations. He organizes the annual Symposium on Industrial and Environmental Case Studies running successfully since 2004 within the International Conference of Computational Methods in Sciences and Engineering (ICCMSE).