



Surrogate-Based Modeling and Optimization for Advanced Decision Making

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Abstract: Surrogate based modeling has been commonly used as a simplification of computationally complex simulations and processes where the underlying equations are unknown (black box models). The computational expense for building a surrogate model is directly related to the number of samples and the complexity of the computational experiments. In many cases, adaptive sampling approaches can be used in order to explore the design space in regions of interest, restraining the number of samples, without the need of exhaustive searches and space-filling designs. This talk will provide a brief introduction to widely used surrogate modeling techniques such as Kriging and radial basis functions. Ideas of how to efficiently build surrogate models utilizing adaptive sampling approaches will be also discussed. Finally, a general approach will be presented to deal with this problem and case studies describing different engineering problems would be used to illustrate the suitability of such a framework based on the work that has been done in our lab for the last 10 years.

Bio: Marianthi Ierapetritou is a Distinguished Professor in the Department of Chemical and Biochemical Engineering at Rutgers University in Piscataway, New Jersey. As of July 1st this year she has been appointed to lead the efforts of the university advancing the careers for women at Rutgers. Dr. Ierapetritou's research focuses on the following areas: 1) process operations; (2) design and synthesis of flexible production systems focusing on pharmaceutical manufacturing; 3) modeling of reactive flow processes; and 4) modeling of biopharmaceutical production. Her research is supported by several federal (FDA, NIH, NSF, ONR, NASA) and industrial (BMS, J&J, GSK, PSE, Bosch, Eli Lilly) grants. Among her accomplishments are the promotion to distinguished professor in 2017, the 2016 Computing and Systems Technology (CAST) division Award in Computing in Chemical Engineering, the highest distinction in the Systems area of the American Institute of Chemical Engineers (AIChE), the Award of Division of Particulate Preparations and Design (PPD) of The Society of Powder Technology, Japan; the Outstanding Faculty Award at Rutgers; the Rutgers Board of Trustees Research Award for Scholarly Excellence; and the prestigious NSF CAREER award. She has also been appointed as a Consultant to the FDA under the Advisory Committee for Pharmaceutical Science and Clinical Pharmacology, elected as a fellow of AIChE and as a Director in the board of AIChE. She has more than 250 publications, and has been an invited speaker to numerous national and international conferences.

Dr. Ierapetritou obtained her BS from The National Technical University in Athens, Greece, her PhD from Imperial College (London, UK) in 1995 and subsequently completed her post-doctoral research at Princeton University (Princeton, NJ) before joining Rutgers University in 1998.