Modern Metaheuristic Algorithms for Engineering Optimization

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Abstract: Engineering optimization is usually NP-hard and thus difficult to solve. Metaheuristic algorithms such as particle swarm optimization start to show their promising power in dealing with global optimization. Most modern metaheuristic algorithms are often nature-inspired, mimicking the successful characteristics of evolution in nature, especially biological systems. They can deal with a wide range of nonlinear multimodal optimization problems, including continuous, discontinuous, discrete and stochastic, and even mixed types. In this talk, we will review the latest developments over the last 15 years to highlight efficient algorithms, including PSO, differential evolution, harmony search, firefly algorithm, and cuckoo search. We will take a unified approach to compare and analyze the main characteristics and major components of these algorithms. Open questions will be presented and their implications on future research topics/directions will also be discussed.

Biographical information: Dr. Xin-She Yang received his PhD in Applied Mathematics from the University of Oxford, then worked at Cambridge University for 5 years, and now is a Senior Research Scientist at National Physical Laboratory. He is the Editor-in-Chief of the journal: *Int. Journal of Mathematical Modelling and Numerical Optimisation.*

His research interests include computational mathematics, optimization and computational intelligence, metaheuristics and industrial applications. He has published 5 books and more than 70 research articles. His book on "Introduction to Computational Mathematics" (World Scientific, 2008) has become the best-selling textbook in 2009 and 2010.

He is the recipient of the Garside Senior Scholar award of Oxford University. He has served as an editorial board member of several international journals, including Elsevier's Journal of Computational Science (JoCS), IJAI and IJBIC, and the editor of OCP Science book series. He has been on program committees of over 10 international conferences such as ICCS'10, MIC'09, EA'09, Meta'08, BIOMA'10, ICAART'10, and WCE'10, and acted as a program co-chair of ITBI'10. In addition, he has organized and co-organized 3 special sessions/workshops at international conferences, including the recent workshop on Computational Optimization, Modelling and Simulations (COMS 2010) at ICCS 2010 in Amsterdam.