

SEMINARIUM RENTGENOWSKIE

Dnia 15.06.2018 r. o godz. 12.00, w sali 203 Instytutu Fizyki PAN, odbędzie się seminarium rtg., na którym dr **Nirupam Chakraborti** z Metallurgical and Materials Engineering, Indian Institute of Technology z Kharagpur w Indiach, wygłosi referat na temat:

"Data-driven Evolutionary Optimization in Materials Science"

part 1 - Outlook (general issues)

part 2 - Details (practical issues)

Summary:

This presentation will include the details showing the two recent algorithms EvoNN (Evolutionary Neural Net) and Bi-objective Genetic Programming (BioGP) developed by the author and his global collaborators [1-2] which are now being widely used in diverse areas of materials research. Among them BioGP is now integrated in the commercial Kimeme software, the flagship product of Cyber Dyn Srl, an Italian software company [3]. Both the algorithms follow a nature inspired approach, trying to mimic some basic aspects of evolutionary biology in a non-biological context, for example, the materials related problems, and follow the principles of multi-objective optimization [4]. The starting point is the noisy data from diverse sources that could be either from industry, experiments or simulation and the next step is to create a set of optimum models following an intelligent strategy for avoiding the random noise in the original information. For a given system, several such models can be created for various *objectives* pertinent to the system in hand and both BioGP and EvoNN allow the users to optimize them simultaneously following the concepts of *Pareto Optimality*, detailed in the literature [5]. Once a model is created it also allows the users to evaluate the interaction between the decision variables, following a simple, intuitive approach. In presentation the basic working principles of both EvoNN and BioGP will be elaborated without assuming any prior exposure in this area. Subsequently, a number of case studies, with special emphasis in the materials and manufacturing area will be taken up on the basis of some elaborate research studies conducted by the author and his collaborators. The results obtained using author's in house software will be shown and analyzed along with those obtained through the commercial Kimeme software that provides the users with several alternate strategies.

Keywords: Optimization; Computational Materials Science; Evolutionary Algorithms

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