Seminar

Institute for Plasma Research

Title : Investigation of Particle swarm optimization technique for multidisciplinary problems

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Date : 13th March 2018 (Tuesday)

Time : 02.00 PM

Venue : Seminar Hall, IPR

Abstract :

Nature inspired techniques deal with the solution of a complex systems using innovative use of phenomenons existing in the nature. Particle Swarm Optimization (PSO) is a technique inspired by the collective behavior found in the swarms such as bird flocking, fish schooling etc. PSO is based on the concept of creation of particles (candidate solutions) and moving them in the search space guided by (a) information exchange within the group and (b) self best performance. During movement, particles organize themselves and move towards a better solution in search space. PSO is useful when the gradient is too laborious or even impossible to calculate. It can also be applied to the non-continuous and non-differentiable problems. The meta optimization of PSO is an active area of research. A PSO code has been developed and validated against standard multi-parameter benchmark functions. The algorithm is then applied to a range of physical problems from different domains and its efficacy under different conditions has been studied. The problems investigated are optimization of electromagnetic coil gun model, fracture model and reactive force field potential model. The work also presents the modification of the PSO technique for solving problems which require evolution of the search space. In summary, it has been demonstrated that the PSO is an efficient technique for complex multidisciplinary problems. However, meta optimization of PSO algorithmic parameters and search space provide better results.