

## PARTICLE SWARM OPTIMIZATION METHOD FOR ENGINEERING NONLINEAR CONSTRAINED OPTIMIZATION

Neculai ANDREI<sup>1</sup>

**Abstract.** *For nonlinear constrained optimization a particle swarm optimization (PSO) method with a new penalty function method is presented. The penalty function includes a composite penalty factor, which introduce a linear progressive penalization subject to the values of the constraint violation into the current point. This new composite penalty function is used into the frame of the particle swarm optimization method. To improve the direct search of PSO a local coordinatewise search is used. The numerical experiments with this new penalization for 10 real nonlinear constrained optimization applications are reported. The obtained results are compared versus the well-known direct search methods COBYLA, DFL and the primal-dual interior-point algorithm with a filter line-search method IPOPT. The conclusion is that minimizing a special penalty function using particle swarm optimization method yield a competitive algorithm being more efficient versus COBYLA and DFL.*

**Keywords:** Particle Swarm Optimization; Penalty function; Composite function; COBYLA; DFL; IPOPT.