A new hybrid algorithm for linear constrained global optimization and an application in Astrophysics

A. Ismael F. Vaz, [*]   Luís Nunes Vicente [†]

João Manuel Fernandes[‡]

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Abstract

PSwarm was developed originally for box-constrained global optimization of functions without derivatives. PSwarm polls as in coordinate search and incorporates in the search step a particle swarm scheme for dissemination and global optimization.

PSwarm has just been extended to handle general linear constraints. The poll step incorporates now linear generators for the tangent cones including a provision for the degenerate case. The search step has also been adapted accordingly. In particular, the initial population for particle swarm is computed by first inscribing an ellipsoid of maximum volume to the feasible set.

We have compared PSwarm to other global and derivative free solvers, for the box-constrained and linear constrained cases, and the results confirm its competitiveness in terms of efficiency and robustness.

If time permits we will discuss the current application of PSwarm to identify optimal parameters in star evolution models in astrophysics.

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[*]Production and systems, University of Minho, `aivaz@dps.uminho.pt`

[†]Mathematics department, University of Coimbra, `lnv@mat.uc.pt`

[‡]Mathematics department, University of Coimbra, `jmfernan@mat.uc.pt`

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