Advanced Course on Sustainable Optimization

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July 23, 2012

Presentation. The sustainable managements of energies, of biodiversity, of exhaustible resources, etc. share common features. They are optimization problems for systems which display nonlinear complex dynamics, multiple objectives and actors, and radical sources of uncertainty. In this course, we present a framework – concepts, models, mathematical and numerical methods – allowing to formalize and to tackle such issues. First, compact models are presented, together with practical computer works. Then, guidelines to attack complex large-size problems are detailed.

Key Words. optimality, constraints, uncertainty, sustainability.

Mathematical Modelling, Sustainability and Management of Natural Resources [course]

1. Control of Deterministic Dynamical Systems
   Sequential Decision Models [course]
   Equilibrium and Stability [course]
   [computer session] Equilibria and Stability in the Management of a Renewable Resource
   Viable Sequential Decisions [course]
   [computer session] Viable Harvesting of a Renewable Resource
   Optimal Sequential Decisions [course]
   Dam Optimal and Viable Deterministic Management

2. Adaptive Control of Uncertain Dynamical Systems
   Sequential Decision Models under Uncertainty [course]
   Robust and Stochastic Viable Control [course]
   [computer session] Dam Viable Management under Uncertainty
   Robust and Stochastic Optimal Control [course]
   [computer session] Dam Optimal Management under Uncertainty
3. Tackling the Complexity of Large-Size Dynamical Uncertain Problems

- Index strategies
- Decomposition-coordination methods
- Evaluation of strategies by simulation