

Outline

Lecture 6: Conic Programming: SDP/SOCP

Semidefinite Programming, SDP

Second Order Cone Programming, SOCP

Lecture 7: Mixed integer Linear Programming: MILP

MILP: The Problem, Algorithms

MILP: Selected Software

Lecture 8: Applications: TSP and QAP

The Traveling Salesman Problem, TSP

The Quadratic Assignment Problem, QAP

Lecture 9: Mixed Integer Nonlinear Programming, Other Problems

Convex and nonconvex MINLP

Other optimization problems

MINLP: The Problem, Algorithms, Software

- ▶ The NEOS Guide is short on MINLP [▶ Link](#)
- ▶ There are eleven codes for MINLP available at NEOS [▶ Link](#)
- ▶ Here are sources on MINLP algorithms and software [▶ Link](#)
- ▶ Here is a library of NLP/MINLP instances in various formats [▶ Link](#)
- ▶ Here is a comparison by one of the commercial competitors [▶ Link](#)
- ▶ Here is a link to our MIQ(C)P benchmark [▶ Link](#)
- ▶ Here is a link to our MINLP benchmark [▶ Link](#)

Selected MINLP Software

- ▶ **Noncommercial codes**

BONMIN, COUENNE, SCIP, MILANO, Minotaur

- ▶ **Commercial codes**

ANTIGONE, BARON, LINDO, KNITRO, MIDACO

- ▶ **Matlab codes**

FMINCONSET, MINLP

- ▶ **Pseudo Boolean codes**

OPBDP

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Other problems, What have we left out?

- ▶ Stochastic Programming, Complementarity Problems, Nonsmooth Optimization
- ▶ Optimal Control Problems, Semi-infinite Optimization, Network Programming
- ▶ In all these areas NEOS offers at least one solver
- ▶ Further areas: Multiobjective Optimization, Simulation-based Optimization
- ▶ Further methods: Heuristic and Metaheuristic Methods
- ▶ Further applications: Topology Opt, Process Opt, Design Opt

Current Challenge:

AC optimal power flow optimization for US [▶ Link](#)