

Séminaire SATIE-CMLA-Institut Farman

Mercredi 16 décembre 2015 à 10h30

ENS Cachan

Amphithéâtre 63 (bâtiment d'Alembert)

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« Two Applications of Mixed Integer Nonlinear Programming (MINLP) in R^n : the Euclidean Steiner Tree Problem and Covering a Solid with Different Sphere »

Abstract:

1-The Euclidean Steiner tree problem (ESTP) in R^n consists of finding a tree of minimal Euclidean length that spans a given set of points in R^n , using or not additional points. Only a few papers consider the exact solution for the ESTP in R^n ($n > 2$) and there are just two works that considered a mathematical programming formulation for the ESTP. One of them presented a convex mixed-integer formulation that could be implemented in a Branch and Bound (B&B) algorithm. This work presents techniques to improve the performance of the B&B algorithm in order to implement this formulation.

2-We present a mathematical programming model for the problem of covering solids by spheres of different radii. Given a set of spheres, possibly with different diameters, and a solid, the goal is to locate the spheres in such a way their union forms a coverage for this solid, using the smallest possible number of spheres of this set. This problem has an application in the radio-surgical treatment planning known as Gamma Knife and can be formulated as a non-convex optimization problem with quadratic constraints and a linear objective function.