



Séminaire du CIRRELT Seminar

Sandra Ngueveu

LAAS-CNRS, Équipe ROC
INP-ENSEEIH Toulouse, France



**PIECEWISE LINEAR BOUNDING OF NONLINEAR UNIVARIATE
FUNCTIONS AND RESULTING MILP-BASED SOLUTION METHODS**

Abstract: Various optimization problems result from the introduction of nonlinear terms into combinatorial optimization problems. Approximations via piecewise linear functions have been proposed in the literature. Non-convex optimization models and heuristics exist to compute optimal breakpoint systems subject to the condition that the piecewise linear continuous approximator (under- and overestimator) never deviates more than a given delta-tolerance from the original continuous separable function over a given finite interval, or to minimize the area between the approximator and the function. We present an alternative solution method based on the upper and lower bounding of nonlinear terms using non-necessarily continuous piecewise linear functions with a relative epsilon-tolerance. Conditions under which such approach yields a pair of mixed integer linear programs with a performance guarantee are analyzed. Models and algorithms to compute the non necessarily continuous piecewise linear functions with absolute and relative tolerances are also presented. Computational evaluations performed on various problems (energy optimization problems for hybrid electric vehicles, knapsack problems with nonlinear cost functions, network design problems under congestion) show the efficiency of the method with regards to the state of the art.

More information: [Sandra Ngueveu](#)

JEUDI / THURSDAY
2 mai 2019 /
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Salle / Room 5441
Pavillon André-Aisenstadt
Université de Montréal

Ouvert à tous / Open to all

Organisateur / Organizer
Bernard Gendron

