ABSTRACT

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Using the resource constraint formulation and decomposition to solve MINLP problems

Many industrial optimization problems are sparse and can be formulated as block-separable mixed-integer nonlinear programming (MINLP) problems, where low-dimensional sub-problems with blocks of variables are linked by a (linear) knapsack-like coupling constraint. To exploit this structure, we have been investigating options to use outer approximation, inner approximation and the so-called resource constraint formulation to develop novel algorithms which can exploit this formulation. Basically, an easy to solve master problem combines solutions of sub-problems, which potentially can be solved in parallel. In our contribution, we will use small examples to showcase the concepts and report on the various approaches we developed and their success on solving benchmark problems and problems from industry.