


Relaxation And Decomposition Methods For Mixed Integer Nonlinear Programming


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Summary : Free relaxation and decomposition methods for mixed integer nonlinear programming pdf download - nonlinear optimization problems containing both continuous and discrete variables are called mixed integer nonlinear programs minlp such problems arise in many fields such as process industry engineering design communications and finance there is currently a huge gap between minlp and mixed integer linear programming mip solver technology with a modern state-of-the-art mip solver it is possible to solve models with millions of variables and constraints whereas the dimension of solvable minlp is often limited by a number that is small relative to three or four orders of magnitude it is theoretically possible to approximate a general minlp by a mip with arbitrary precision however good mip approximations are usually much larger than the original problem moreover the approximation of nonlinear functions by piecewise linear functions can be difficult and time-consuming in this book relaxation and decomposition methods for solving nonconvex structured minlps are proposed in particular a generic branch-cut-and-price bcp framework for minlp is presented bcp is the underlying concept in almost all modern mip solvers providing a powerful decomposition framework for both sequential and parallel solvers it made the success of the current mip technology possible so far generic bcp frameworks have been developed only for mip for example coin bcp ibm 2003 and abacus oreas gmbh 1999 in order to generalize mip-bcp to minlp-bcp the following points have to be taken into account a given sparse minlp is reformulated as a block-separable program with linear coupling constraints the block structure makes it possible to generate lagrangian cuts and to apply lagrangian heuristics in order to facilitate the generation of polyhedral relaxations nonlinear convex relaxations are constructed the minlp separation and pricing subproblems for generating cuts and columns are solved with specialized minlp solvers

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