

## عنوان مقاله:

Global optimization of mixed-integer polynomial programming problems: A new method based on Grobner bases theory

## محل انتشار:

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## خلاصه مقاله:

Mixed-integer polynomial programming (MIPP) problems are one class of mixed-integer nonlinear programming (MINLP) problems where objective function and constraints are restricted to the polynomial functions. Although the MINLP problem is NP-hard, in special cases such as MIPP problems, an efficient algorithm can be extended to solve it. In this research, we propose an algorithm for global optimization of the MIPP problems, in which, first, the MIPP is reformulated as a multi-parametric programming by considering integer variables as parameters. Then, the optimality conditions of resulting parametric programming give a parametric polynomial equations system (PES) that is solved analytically by Grobner bases (GB) theory. After solving PES, the parametric optimal solution as a function of the relaxed integer variables is obtained. A simple discrete optimization problem is resulted for any non-imaginary parametric solution of PES, which the global optimum solution of MIPP is determined by comparing their optimal value. Some numerical examples are provided to clarify proposed algorithm and extend it for solving the MINLP problems. Finally, a performance analysis is conducted to demonstrate the practical efficiency of the proposed method.

## کلمات کلیدی:

Mixed-integer polynomial programming (MIPP), parametric programming, Polynomial equations system (PES), Grobner bases theory

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