Generalized Rosser's Algorithm And New Integer Extended ABS Algorithms For Solving Linear Diophantine Equations

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Systems of linear Diophantine equations play major roles in solving integer programming problems. Rosser's algorithm [3] for solving linear Diophantine equations is considered to be a robust and reliable approach. We first describe a generalization of Rosser's algorithm for a single linear Diophantine equation to an algorithm for solving systems of linear Diophantine equations. Next we show that the generalized Rosser's algorithm (GRA) presents a new formulation of the LDSSBR of Chou and Collins [1]. Then we consider the integer *ABS* algorithms given by Esmaeili, Mahdavi-Amiri and Spedicato (the so called EMAS algorithms) [2] and show how to modify the EMAS algorithms so that the new algorithms generate the same solution iterates as the GRA. We then present a new class of integer algorithms, based on extended ABS algorithms (EABS) for the real case, improving both upon the efficiency of the EMAS algorithms by generating Abaffians with independent rows and controlling the growth of intermediate results. Finally, we show that the EMAS algorithms and the GRA (and hence the LDSSBR) belong to our new class of integer EABS algorithms (IEABS). Thus, we expect that the new IEABS algorithms, with its new parameters of choice, include reliable and competitive algorithms for solving linear Diophantine equations.

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References

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