

# Solving Linear Optimization Problem with Max-Łukasiewicz Bipolar Fuzzy Relation Equations

Vijay Lakshmi Tiwari<sup>1</sup> and Antika Thapar<sup>2</sup>

<sup>1</sup>Ph.D. Scholar, Dayalbagh Educational Institute, Dayalbagh, Agra

<sup>2</sup>Faculty, Dayalbagh Educational Institute, Dayalbagh, Agra

E-mail: <sup>1</sup>[vijaylakshmi.maths@gmail.com](mailto:vijaylakshmi.maths@gmail.com), <sup>2</sup>[antikathapar@gmail.com](mailto:antikathapar@gmail.com)

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**Abstract**—*In this paper, a linear optimization problem with max-Łukasiewicz bipolar fuzzy relation equations as constraints is considered. This type of optimization problem is important in modeling those real life problems where bipolar character is involved, such as to optimize public awareness in revenue management. Some properties of the solution set of max-Łukasiewicz bipolar fuzzy relation equations are discussed. The considered type of optimization problem lies in the class of NP-hard problems but it can be transformed to an equivalent 0-1 integer programming problem in polynomial time. In the literature, some methods have been proposed based on 0-1 integer programming problem or reduction rules for solving linear optimization problem with max-Łukasiewicz bipolar fuzzy relation equations as constraints. To reduce the computational work involved in previous methods, in this paper, the equivalent 0-1 integer programming problem is solved using genetic algorithm. A new method based on binary coded genetic algorithm is proposed to find the optimal solutions of the equivalent problem. Numerical example explains the working of the proposed algorithm.*