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Ph.D. ABSTRACTS

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accurate. It was recommended that HBDF and HLM should be preferred in solving general second and third order ODEs over the existing methods.

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Title: Standardization of the Arbitrary Control Parameter in the Transformation Procedure of Karmarkar Algorithm
Year: 2016
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ABSTRACT

The current transformation procedure of Karmarkar algorithm from the original Linear Programming (LP) problem requires the choice of control parameter U to be sufficiently large. However, how much sufficiently large the parameter should be was not suggested by the algorithm. It is arbitrary and at the discretion of the problem solver. This usually results to different solutions when solved by different analysts. Thus, the objectives of the study were to: (i) propose an algorithm that standardizes the choice of the arbitrary control parameter using a heuristic approach; (ii) formulate a real world problem that has at least 100 variables using Integer Programming to test the reliability of the proposed algorithm; (iii) use Octave code to confirm the validity of the proposed algorithm; and (iv) conduct post-optimality analysis in order to determine how sensitive solutions are to changes in data.

The method of solution followed a heuristic approach in which Nyor-Rauf algorithm was proposed. The governing equation with the inclusion of the big M-Method
followed Karmarkar assumed LP form:
Minimize
Z = CTX
subject to
AX = 0
1X = 1
X _ 0
where, Z denotes the objective function, X, the variable vector, C, the coefficient of the objective function, 1, a vector of unit entries, T the transpose and A, a given matrix of real numbers. All the constraints above are homogeneous equations except for the constraint
1X =
Xn
j=i
xj = 1;
which defines an n-dimensional simplex.

The results of the study revealed that:

(i) proposed Nyor-Rauf algorithm provided a standard optimal control parameter in any given LP problem and yielded an improved result over Karmarkar's transformation method;
(ii) integer formulation of real-life problem worked consistently well and proved reliable;
(iii) Octave code confirmed the validity of Nyor-Rauf algorithm; and
(iv) post optimality analysis showed that, the proposed algorithm has a robust tolerance.

The study concluded that Nyor-Rauf transformation algorithm is an introduction of a potent option among the transformation procedures in the class of Interior Point Methods for handling LPs. Hence, Nyor-Rauf algorithm is recommended as a preferred algorithm for transforming LP problem from original problem to Karmarkar form.