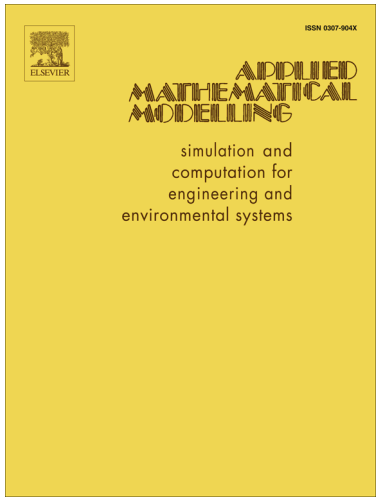

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Modeling and Optimization of Multi Objective Non-linear Programming Problem in Intuitionistic Fuzzy Environment

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Abstract

In dealing with real world practical optimization problems, a decision maker usually faces a state of uncertainty as well as hesitation, due to various unpredictable factors. Sometimes it is necessary to optimize several non-linear and conflicting objectives simultaneously. To deal with the uncertain parameters which arise in such situations, intuitionistic fuzzy numbers are utilized. We formulate a multiobjective non-linear programming problem in intuitionistic fuzzy environment. We propose a linear ranking function and utilize it to convert the intuitionistic fuzzy model into a crisp model. After converting the problem into equivalent crisp problem, we propose a non-linear membership function and develop various approaches for solving it by using different operators and fuzzy programming technique. We apply our methodologies for justification to a numerical problem in manufacturing systems.

Keywords: Multiple objective programming; Intuitionistic fuzzy number; Accuracy function; Nonlinear programming

1. Introduction

Most of the real world problems are inherently characterized by multiple and conflicting aspects of evaluation. This evaluation is generally judged by optimizing multiple objective functions. Furthermore, when addressing real world problems, frequently the parameters are imprecise numerical quantities due to different uncontrollable factors. Fuzzy quantities are very adequate for modeling these situations. The application of fuzzy set theory to decision making has gained considerable attention by many authors ([2],[5]) after the pioneering work of Bellman and Zadeh ([12]). However, the current research on fuzzy mathematical programming is limited to the range of linear programming and multiobjective linear programming ([1], [5], [8], [11], [13],[16]). Fuzzy non-linear programming (FNLP) is rarely involved. In many practical problems such as in industrial planning there exist many fuzzy and intuitionistic fuzzy nonlinear production, planning and scheduling problems. These problems cannot be modeled and solved by traditional techniques due to presence of imprecise information. So, the research on modeling and optimization for nonlinear programming under

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