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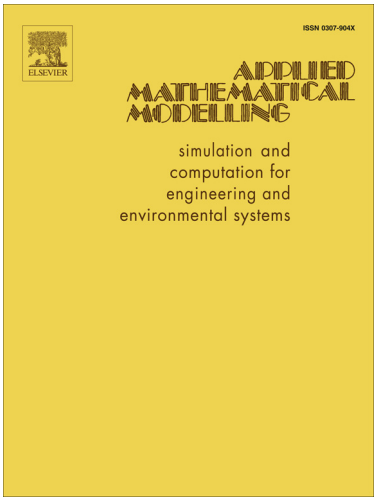

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Ranking triangle and trapezoidal fuzzy numbers based on the relative preference relation

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Abstract

In this paper, we first propose a fuzzy preference relation with membership function representing preference degree to compare two fuzzy numbers. Then a relative preference relation is constructed on the fuzzy preference relation to rank a set of fuzzy numbers. Since the fuzzy preference relation is a total ordering relation satisfying reciprocal and transitive laws on fuzzy numbers, the relative preference relation satisfies a total ordering relation on fuzzy numbers as well. Normally, utilizing preference relation is more reasonable than defuzzification on ranking fuzzy numbers, because defuzzification does not present preference degree between two fuzzy numbers and loses some messages. However, fuzzy pair-wise comparison by preference relation is complex and difficult. To avoid above shortcomings, the relative preference relation adopts the strengths of defuzzification and fuzzy preference relation. That is to say, the relative preference relation expresses preference degrees of several fuzzy numbers over average as similar as the fuzzy preference relation does, and ranks fuzzy numbers by relative crisp values as defuzzification does. Thus utilizing the relative preference relation ranks fuzzy numbers easily and quickly, and is able to reserve fuzzy information.

Keywords: fuzzy numbers; fuzzy preference relation; pair-wise comparison; ranking; relative preference relation

1. Introduction

Since Jain, Dubois and Prade[1-3] proposed related concept for fuzzy numbers, comparing fuzzy numbers had been an important issue of fuzzy aspect. For instance, Bortolan and Degani[4] reviewed fuzzy ranking methods in 1985, Lee and Li[5] proposed comparison of fuzzy numbers based on the probability measure of fuzzy events in 1988, Chen and Hwang[6] expressed fuzzy multiple attribute decision making in 1992, Choobineh and Li[7] developed an index for ordering fuzzy numbers in 1993, Dias[8] used fuzzy numbers to rank alternatives in 1993, Lee, Cho and

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