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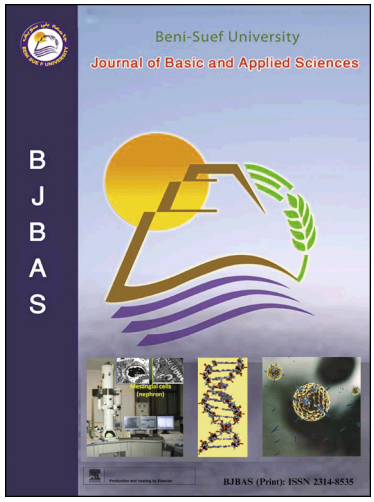

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ACCEPTED MANUSCRIPT

A FUZZY LOGIC BASED PROMETHEE METHOD FOR MATERIAL SELECTION PROBLEMS

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Abstract

Material selection is a complex problem in the design and development of products for diverse engineering applications. This paper presents a fuzzy PROMETHEE (Preference Ranking Organization Method for Enrichment Evaluation) method based on trapezoidal fuzzy interval numbers that can be applied to the selection of materials for an automotive instrument panel. Also, it presents uniqueness in making a significant contribution to the literature in terms of the application of fuzzy decision-making approach to material selection problems. The method is illustrated, validated, and compared against three different fuzzy MCDM methods (fuzzy VIKOR, fuzzy TOPSIS, and fuzzy ELECTRE) in terms of its ranking performance. Also, the relationships between the compared methods and the proposed scenarios for fuzzy PROMETHEE are evaluated via the Spearman's correlation coefficient. *Styrene Maleic Anhydride* and *Polypropylene* are determined optionally as suitable materials for the automotive instrument panel case. We propose a generic fuzzy MCDM methodology that can be practically implemented to material selection problem. The

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