

Contents

1	Index Matrices: Definitions, Operations, Relations	1
1.1	Definitions of an Index Matrix with Real Number Elements and $(0, 1)$ -index Matrix	1
1.2	Operations Over $\mathcal{R}$ -IMs and $(0, 1)$ -IMs	2
1.3	Relations Over $\mathcal{R}$ -IM and $(0, 1)$ -IM	9
1.4	Index Matrices with Elements Logical Variables, Propositions or Predicates	10
1.5	Relations Over L-IMs	14
1.6	Operations “Reduction” Over an $\mathcal{R}$ -IM, $(0, 1)$ -IM and L-IM	15
1.7	Operation “Projection” Over an $\mathcal{R}$ -IM, $(0, 1)$ -IM and L-IM	16
1.8	Operation “Substitution” Over an $\mathcal{R}$ -IM, $(0, 1)$ -IM and L-IM	17
1.9	An Example from Number Theory	18
1.10	An Example from Graph Theory	20
2	Intuitionistic Fuzzy IMs	29
2.1	Short Remarks on Intuitionistic Fuzziness	29
2.2	IFIMs and EIFIMs	30
2.3	Standard Operations Over EIFIMs	33
2.4	Relations Over EIFIMs	37
2.5	Level Operators Over EIFIMs	38
2.6	Aggregation Operations Over EIFIMs	39
2.7	Extended Modal Operators Defined Over EIFIMs	44
2.8	An Example with Intuitionistic Fuzzy Graphs	45
3	Extended Index Matrices	51
3.1	Definition of an Extended Index Matrix	51
3.2	Operations Over EIMs	52
3.3	Relations Over EIMs	53
3.4	Hierarchical Operators Over EIMs	54
3.5	New Operations Over EIMs	59
3.6	EIMs, Determinants and Permanents	62

3.7	Transposed EIM.	63
3.8	An Example: An Intercriteria Decision Making Method	64
4	Temporal IFIMs	69
4.1	Operations Over ETIFIMs	71
4.2	Relations Over ETIFIMs	74
4.3	Specific Operations Over ETIFIMs	77
4.4	An Example: Temporal Intuitionistic Fuzzy Cognitive Map	79
5	Index Matrices with Function-Type of Elements	83
5.1	Definition of the Index Matrix with Function-Type of Elements	83
5.2	Standard Operations Over IMFES	84
5.3	Relations Over IMFES	85
5.4	Operations Over IMFES and IMs	88
5.5	An Example: IM-Interpretation of a Multilayer Perceptron.	89
6	Three Dimensional IMs	95
6.1	Definition of a Three Dimensional IMs	95
6.2	Operations Over 3D-IMs	96
6.3	Relations Over 3D-IMs	100
6.4	Operations “Reduction” Over an 3D-IM	101
6.5	Operation “Projection” Over an IM	102
6.6	Operation “Substitution” Over an 3D-IM.	103
6.7	An Example with Bookshops.	103
	References.	107
	Index	109

Index Matrices: Towards an Augmented Matrix Calculus

Atanassov, K.T.

2014, XII, 110 p. 20 illus., Hardcover

ISBN: 978-3-319-10944-2