

## REPRESENTATION AND CONSTRUCTION OF INTUITIONISTIC FUZZY $\mathcal{T}$ -PREORDERS AND FUZZY WEAK $\mathcal{T}$ -ORDERS

BRAHIM ZIANE

*Laboratory of Pure and Applied Mathematics  
Department of Mathematics, University of Msila  
P.O. Box 166 Ichbilia, M'sila 28105, Algeria  
and Ecole Normale Supérieure de Bousaada  
M'sila 28200, Algeria*  
**e-mail:** brahim.ziane@univ-msila.dz

AND

ABDELAZIZ AMROUNE

*Laboratory of Pure and Applied Mathematics  
Department of Mathematics, University of Msila  
P.O. Box 166 Ichbilia, M'sila 28105, Algeria*  
**e-mail:** abdelaziz.amroune@univ-msila.dz

### Abstract

In this paper, we consider the problem of representation and construction of intuitionistic fuzzy preorders and weak orders, where many fundamental representation results extending those of Ulrich Bodenhofer *et al.* are presented.

**Keywords:** intuitionistic fuzzy set, intuitionistic fuzzy ordering relation, intuitionistic fuzzy equivalence relation, intuitionistic fuzzy weak order, intuitionistic fuzzy t-norm, residuated lattice.

**2010 Mathematics Subject Classification:** 03B52, 06B23, 03E04, 03F55, 03G10, 03E72.

### REFERENCES

- [1] K.T. Atanassov, *Intuitionistic fuzzy sets vii itkr's session*, Sofia 1 (1983) 983.
- [2] K.T. Atanassov, *Intuitionistic fuzzy sets*, Fuzzy Sets and Systems 1 (1986) 87–96.  
doi:10.1016/S0165-0114(86)80034-3

- [3] U. Bodenhofer, B. De Baets and J. Fodor, *A compendium of fuzzy weak orders: Representations and constructions*, Fuzzy Sets and Systems **158** (2007) 811–829.  
doi:10.1016/j.fss.2006.10.005
- [4] P. Burillo, J. Pedro and H. Bustince, *Intuitionistic fuzzy relations* (part i), Mathware and Soft Computing **2** (1995) 5–38.
- [5] H. Bustince and P. Burillo, *Intuitionistic fuzzy relations* (part ii), Mathware and Soft Computing **2** (1995) 117–148.
- [6] C. Cornelis, M. De Cock and E.E. Kerre, *Intuitionistic fuzzy rough sets: at the crossroads of imperfect knowledge*, Expert Systems **20** (2003) 260–270.  
doi:10.1111/1468-0394.00250
- [7] C. Cornelis, G. Deschrijver and E.E. Kerre, *Classification of intuitionistic fuzzy implicants: An algebraic approach*, In JCIS (2002) 105–108.
- [8] C. Cornelis, G. Deschrijver and E.E. Kerre, *Implication in intuitionistic fuzzy and interval-valued fuzzy set theory: construction, classification, application*, Int. J. Approximate Reasoning **35** (2004) 55–95.  
doi:10.1016/S0888-613X(03)00072-0
- [9] G. Deschrijver, C. Cornelis and E.E. Kerre, *On the representation of intuitionistic fuzzy t-norms and t-conorms*, IEEE Transactions on Fuzzy Systems **12** (2004) 45–61.  
doi:10.1109/TFUZZ.2003.822678
- [10] G. Deschrijver and E.E. Kerre, *Classes of intuitionistic fuzzy t-norms satisfying the residuation principle*, Int. J. Uncertainty, Fuzziness and Knowledge-Based Systems **11** (2003) 691–709.  
doi:10.1142/S021848850300248X
- [11] G. Deschrijver and E.E. Kerre, *On the relationship between some extensions of fuzzy set theory*, Fuzzy Sets and Systems **133** (2003) 227–235.  
doi:10.1016/S0165-0114(02)00127-6
- [12] P. Hájek, Metamathematics of Fuzzy Logic, Trends in Logic Studia Logica Library **4** (Kluwer Academic Publishers, Dordrecht, 1998).  
doi:10.1007/978-94-011-5300-3
- [13] E.P. Klement and R. Mesiar, Logical, Algebraic, Analytic and Probabilistic Aspects of Triangular Norms (Elsevier, 2005).  
doi:10.1007/978-94-015-9540-7
- [14] E.P. Klement, R. Mesiar and E. Pap, Triangular Norms **8** (Springer Science and Business Media, 2013).
- [15] D. Piciu, *Algebras of fuzzy logic*, Univ. Craiova Publ. House, Craiova (Romania, 2007).  
doi:10.1155/2012/763428
- [16] L.A. Zadeh, *Fuzzy sets, information and control*, **8** (1965) 338–353.  
doi:10.1016/S0019-9958(65)90241-X

- [17] X. Zhang, B. Zhou and P. Li, *A general frame for intuitionistic fuzzy rough sets*, Inform. Sci. **216** (2012) 34–49.  
doi:10.1016/j.ins.2012.04.018

Received 29 December 2019

Revised 15 May 2020

Accepted 30 June 2020