

**Cornejo, María Eugenia; Medina, Jesús; Ramírez-Poussa, Eloisa**

**Adjoint triples and residuated aggregators.** (English) [Zbl 1432.03106](#)

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Summary: Several domains, such as fuzzy logic programming, formal concept analysis and fuzzy relation equations, consider basic operators which need to have associated residuated implications. Adjoint triples are formed by operators satisfying weak properties, usefully used in these domains. This paper presents the comparison of these triples with other general operators considered in these frameworks.

For the entire collection see [\[Zbl 1385.68008\]](#).

**MSC:**

**03E72** Theory of fuzzy sets, etc.

**03G25** Other algebras related to logic

**06A15** Galois correspondences, closure operators (in relation to ordered sets)

**Keywords:**

[adjoint triples](#); [implication triples](#); [u-norms](#); [uninorms](#)

**Full Text:** [DOI](#)

**References:**

- [1] Aguiló, I., Suñer, J., Torrens, J.: A characterization of residual implications derived from left-continuous uninorms. *Information Sciences* 180(20), 3992-4005 (2010) · [Zbl 1204.03028](#) · [doi:10.1016/j.ins.2010.06.023](#)
- [2] Bělohávek, R.: Concept equations. *Journal of Logic and Computation* 14(3), 395-403 (2004) · [Zbl 1057.03021](#) · [doi:10.1093/logcom/14.3.395](#)
- [3] Bělohávek, R.: Sup-t-norm and inf-residuum are one type of relational product: Unifying framework and consequences. *Fuzzy Sets and Systems* 197, 45-58 (2012) · [Zbl 1266.03056](#) · [doi:10.1016/j.fss.2011.07.015](#)
- [4] Benado, M.: Les ensembles partiellement ordonnés et le théorème de raffinement de Schreier, II. *Théorie des multistruktures. Czechoslovak Mathematical Journal* 5(80), 308-344 (1955) · [Zbl 0068.25902](#)
- [5] Cordero, P., Gutiérrez, G., Martínez, J., de Guzmán, I.P.: A new algebraic tool for automatic theorem provers. *Annals of Mathematics and Artificial Intelligence* 42(4), 369-398 (2004) · [Zbl 1095.68110](#) · [doi:10.1023/B:AMAI.0000038312.77514.3c](#)
- [6] Cornejo, M., Medina, J., Ramírez, E.: A comparative study of adjoint triples. *Fuzzy Sets and Systems* 211, 1-14 (2013) · [Zbl 1272.03111](#) · [doi:10.1016/j.fss.2012.05.004](#)
- [7] Cornejo, M.E., Medina, J., Ramírez, E.: Implication triples versus adjoint triples. In: Cabestany, J., Rojas, I., Joya, G. (eds.) *IWANN 2011, Part II. LNCS*, vol. 6692, pp. 453-460. Springer, Heidelberg (2011) · [doi:10.1007/978-3-642-21498-1\\_57](#)
- [8] De Baets, B., Fodor, J.: Residual operators of uninorms. *Soft Computing* 3(2), 89-100 (1999) · [Zbl 1268.03027](#) · [doi:10.1007/s005000050057](#)
- [9] Della Stella, M.E., Guido, C.: Associativity, commutativity and symmetry in residuated structures, vol. 30(2), pp. 363-401. Springer Science+Business Media (2013) · [Zbl 1282.03026](#)
- [10] Díaz, J.C., Medina, J.: Multi-adjoint relation equations: Definition, properties and solutions using concept lattices. *Information Sciences* 253, 100-109 (2013) · [Zbl 1320.68173](#) · [doi:10.1016/j.ins.2013.07.024](#)
- [11] Díaz, J.C., Medina, J.: Solving systems of fuzzy relation equations by fuzzy property-oriented concepts. *Information Sciences* 222, 405-412 (2013) · [Zbl 1293.68258](#) · [doi:10.1016/j.ins.2012.08.017](#)
- [12] Díaz-Moreno, J., Medina, J., Ojeda-Aciego, M.: On basic conditions to generate multi-adjoint concept lattices via galois connections. *International Journal of General Systems* 43(2), 149-161 (2014) · [Zbl 1320.06005](#) · [doi:10.1080/03081079.2013.879302](#)
- [13] Dilworth, R.P., Ward, M.: Residuated lattices. *Transactions of the American Mathematical Society* 45, 335-354 (1939) · [Zbl 65.0084.01](#) · [doi:10.1090/S0002-9947-1939-1501995-3](#)
- [14] Fodor, J.C., Yager, R.R., Rybalov, A.: Structure of uninorms. *Int. J. Uncertain. Fuzziness Knowl.-Based Syst.* 5(4), 411-427 (1997) · [Zbl 1232.03015](#) · [doi:10.1142/S0218488597000312](#)
- [15] Guido, C., Toto, P.: Extended-order algebras. *Journal of Applied Logic* 6(4), 609-626 (2008) · [Zbl 1157.03041](#) · [doi:10.1016/j.jal.2008.01.001](#)
- [16] Klement, E., Mesiar, R., Pap, E.: *Triangular norms*. Kluwer Academic (2000) · [Zbl 0972.03002](#)
- [17] Lin, J.-L., Wu, Y.-K., Guu, S.-M.: On fuzzy relational equations and the covering problem. *Information Sciences* 181(14), 2951-2963 (2011) · [Zbl 1231.03047](#) · [doi:10.1016/j.ins.2011.03.004](#)

- [18] Medina, J.: Multi-adjoint property-oriented and object-oriented concept lattices. *Information Sciences* 190, 95-106 (2012) · [Zbl 1248.68479](#) · [doi:10.1016/j.ins.2011.11.016](#)
- [19] Medina, J., Ojeda-Aciego, M., Ruiz-Calviño, J.: Fuzzy logic programming via multilattices. *Fuzzy Sets and Systems* 158, 674-688 (2007) · [Zbl 1111.68016](#) · [doi:10.1016/j.fss.2006.11.006](#)
- [20] Medina, J., Ojeda-Aciego, M., Ruiz-Calviño, J.: Formal concept analysis via multi-adjoint concept lattices. *Fuzzy Sets and Systems* 160(2), 130-144 (2009) · [Zbl 1187.68589](#) · [doi:10.1016/j.fss.2008.05.004](#)
- [21] Medina, J., Ojeda-Aciego, M., Valverde, A., Vojtáš, P.: Towards biresiduated multi-adjoint logic programming. In: Conejo, R., Urretavizcaya, M., Pérez-de-la-Cruz, J.-L. (eds.) CAEPIA-TTIA 2003. LNCS (LNAI), vol. 3040, pp. 608-617. Springer, Heidelberg (2004) · [doi:10.1007/978-3-540-25945-9\\_60](#)
- [22] Medina, J., Ojeda-Aciego, M., Vojtáš, P.: Multi-adjoint logic programming with continuous semantics. In: Eiter, T., Faber, W., Truszczyński, M. (eds.) LPNMR 2001. LNCS (LNAI), vol. 2173, pp. 351-364. Springer, Heidelberg (2001) · [Zbl 1007.68023](#)
- [23] Medina, J., Ojeda-Aciego, M., Vojtáš, P.: Similarity-based unification: a multi-adjoint approach. *Fuzzy Sets and Systems* 146, 43-62 (2004) · [Zbl 1073.68026](#) · [doi:10.1016/j.fss.2003.11.005](#)
- [24] Medina, J., Ruiz-Calviño, J.: Fuzzy formal concept analysis via multilattices: first prospects and results. In: *The 9th International Conference on Concept Lattices and Their Applications (CLA 2012)*, pp. 69-79 (2012)
- [25] Morsi, N.N.: Propositional calculus under adjointness. *Fuzzy Sets and Systems* 132(1), 91-106 (2002) · [Zbl 1029.03012](#) · [doi:10.1016/S0165-0114\(02\)00108-2](#)
- [26] Nguyen, H.T., Walker, E.: *A First Course in Fuzzy Logic*, 3rd edn. Chapman & Hall, Boca Ratón (2006) · [Zbl 1405.03001](#)
- [27] Schweizer, B., Sklar, A.: Associative functions and abstract semigroups. *Publ. Math. Debrecen* 10, 69-81 (1963) · [Zbl 0119.14001](#)
- [28] Yager, R.R., Rybalov, A.: Uninorm aggregation operators. *Fuzzy Sets and Systems* 80(1), 111-120 (1996) · [Zbl 0871.04007](#) · [doi:10.1016/0165-0114\(95\)00133-6](#)

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