

**Teheux, Bruno**

**A duality for the algebras of a Łukasiewicz  $n + 1$ -valued modal system.** (English)

Zbl 1127.03050

Stud. Log. 87, No. 1, 13-36 (2007).

Summary: In this paper, we develop a duality for the varieties of a Łukasiewicz  $n + 1$ -valued modal system. This duality is an extension of Stone duality for modal algebras. Some logical consequences (such as completeness results, correspondence theory etc.) are then derived and we propose some ideas for future research.

**MSC:**

03G25 Other algebras related to logic  
03B45 Modal logic (including the logic of norms)  
03B50 Many-valued logic  
06D35 MV-algebras

Cited in 8 Documents

**Keywords:**

topological duality; MV-algebras; many-valued modal logics; relational semantics

**Full Text:** DOI

**References:**

- [1] Blackburn Patrick, Maarten de Rijke, Yde Venema (2001) Modal logic, vol. 53 of Cambridge Tracts in Theoretical Computer Science. Cambridge University Press, Cambridge · Zbl 0988.03006
- [2] Burris Stanley, Sankappanavar H.P. (1981) A course in universal algebra, vol. 78 of Graduate Texts in Mathematics. Springer-Verlag, New York · Zbl 0478.08001
- [3] Chagrov Alexander, Michael Zakharyashev (1997) Modal logic, vol. 35 of Oxford Logic Guides. Oxford Science Publications, The Clarendon Press Oxford University Press, New York · Zbl 0871.03007
- [4] Chang C.C. (1958) 'Algebraic analysis of many valued logics', Trans. Amer. Math. Soc. 88: 467-490 · Zbl 0084.00704 · doi:10.1090/S0002-9947-1958-0094302-9
- [5] Chang C.C. (1959) 'A new proof of the completeness of the Łukasiewicz axioms', Trans. Amer. Math. Soc. 93: 74-80 · Zbl 0093.01104
- [6] Cignoli R. (1996) 'Natural dualities for the algebras of Łukasiewicz finite-valued logics', Bull. Symbolic Logic 2(2): 218
- [7] Cignoli Roberto, Eduardo J. Dubuc, Daniele Mundici (2004) 'Extending Stone duality to multisets and locally finite MV-algebras', J. Pure Appl. Algebra 189(1-3): 37-59 · Zbl 1055.06004 · doi:10.1016/j.jpaa.2003.10.021
- [8] Cignoli Roberto L.O., Itala M.L. D'Ottaviano, Daniele Mundici (2000) Algebraic foundations of many-valued reasoning, vol. 7 of Trends in Logic-Studia Logica Library. Kluwer Academic Publishers, Dordrecht · Zbl 0937.06009
- [9] Clark David M., Brian A. Davey (1998) Natural dualities for the working algebraist, vol 57. of Cambridge Studies in Advanced Mathematics. Cambridge University Press, Cambridge · Zbl 0910.08001
- [10] Esakia Leo, Revaz Grigolia (1977) 'The criterion of Brouwerian and closure algebras to be finitely generated', Polish Acad. Sci. Inst. Philos. Sociol. Bull. Sect. Logic 6(2): 46-52 · Zbl 0407.03048
- [11] Fitting Melvin (1992) 'Many-valued modal logics. II', Fund. Inform. 17(1-2): 55-73 · Zbl 0772.03006
- [12] Fitting Melvin (1995) 'Tableaus for many-valued modal logic', Studia Logica 55(1): 63-87 · Zbl 0837.03017 · doi:10.1007/BF01053032
- [13] Fitting M. (1991) 'Many-valued modal logics', Fund. Inform. 15(3-4): 235-254 · Zbl 0745.03018
- [14] Gehrke Mai, Bjarni Jónsson (2004) 'Bounded distributive lattice expansions', Math. Scand. 94(1): 13-45 · Zbl 1077.06008
- [15] Gehrke Mai, Hideo Nagahashi, Yde Venema (2005) 'A Sahlqvist theorem for distributive modal logic', Ann. Pure Appl. Logic 131(1-3): 65-102 · Zbl 1077.03009 · doi:10.1016/j.apal.2004.04.007
- [16] Gottwald Siegfried (2001) A treatise on many-valued logics, vol. 9 of Studies in Logic and Computation. Research Studies Press Ltd., Baldock · Zbl 1048.03002
- [17] Hájek Petr (1998) Metamathematics of fuzzy logic, vol. 4 of Trends in Logic-Studia Logica Library. Kluwer Academic Publishers, Dordrecht
- [18] Hansoul G. (1983) 'A duality for Boolean algebras with operators', Algebra Universalis 17(1): 34-49 · Zbl 0524.06022 · doi:10.1007/BF01194512
- [19] Hansoul, G., and B. Teheux, 'Completeness results for many-valued Łukasiewicz modal systems and relational semantics',

arXiv:math.LO/0612542, 2006.

- [20] Jónsson Bjarni, Alfred Tarski (1951) 'Boolean algebras with operators. I', Amer. J. Math. 73: 891–939 · [Zbl 0045.31505](#) · [doi:10.2307/2372123](#)
- [21] Jónsson Bjarni, Alfred Tarski (1952) 'Boolean algebras with operators. II', Amer. J. Math. 74: 127–162 · [Zbl 0049.15801](#) · [doi:10.2307/2372074](#)
- [22] Kheltent, M., and G. Hansoul, 'Stone- $\mathcal{C}$  compactifications of topological structures', manuscript.
- [23] Kripke Saul A. (1963) 'Semantical analysis of modal logic. I. Normal modal propositional calculi', Z. Math. Logik Grundlagen Math. 9: 67–96 · [Zbl 0118.01305](#) · [doi:10.1002/malq.19630090502](#)
- [24] Kupke, Clemens, Alexander Kurz, and Dirk Pattinson, 'Algebraic semantics for coalgebraic logics', in Proceedings of the Workshop on Coalgebraic Methods in Computer Science, vol. 106 of Electron. Notes Theor. Comput. Sci., Elsevier, Amsterdam, 2004, pp. 219–241 (electronic). · [Zbl 1271.03031](#)
- [25] Kupke Clemens, Alexander Kurz, Yde Venema (2004) 'Stone coalgebras', Theoret. Comput. Sci. 327(1-2): 109–134 · [Zbl 1075.68053](#) · [doi:10.1016/j.tcs.2004.07.023](#)
- [26] Łukasiewicz Jan (1920) 'O logice trójwartościowej', *Ruch Filozoficzny* 5: 170–171
- [27] Łukasiewicz, Jan, Selected works, North-Holland Publishing Co., Amsterdam, 1970. Edited by L. Borkowski, Studies in Logic and the Foundations of Mathematics. · [Zbl 0212.00902](#)
- [28] Łukasiewicz Jan, Alfred Tarski (1930) 'Untersuchungen über den ausagenkalkül', *Compte Rendus Séances Société des Sciences et Lettres Varsovie* 23: 30–50 · [Zbl 57.1319.01](#)
- [29] Martínez N.G. (1990) 'The Priestley duality for Wajsberg algebras', *Studia Logica* 49(1): 31–46 · [Zbl 0717.03026](#) · [doi:10.1007/BF00401552](#)
- [30] McKinsey J.C.C. (1941) 'A solution of the decision problem for the Lewis systems S2 and S4, with an application to topology', *J. Symbolic Logic* 6: 117–134 · [Zbl 0063.03863](#) · [doi:10.2307/2267105](#)
- [31] Niederkorn Philippe (2001) 'Natural dualities for varieties of MV-algebras. I', *J. Math. Anal. Appl.* 255(1): 58–73 · [Zbl 0974.06006](#) · [doi:10.1006/jmaa.2000.7153](#)
- [32] Niederkorn, Philippe, Algebraic aspects of fuzzy logic: BL-algebras and their hoop subreducts, Ph.D. thesis, University of Liège, 2002.
- [33] Ostermann Pascal (1988) 'Many-valued modal propositional calculi', *Z. Math. Logik Grundlag. Math.* 34(4): 343–354 · [Zbl 0661.03011](#) · [doi:10.1002/malq.19880340411](#)
- [34] Rescher, Nicolas, Many-valued Logic, McGraw-Hill, 1969.
- [35] Rosser, J. Barkley, and Atwell R. Turquette, Many-valued logics, Studies in Logic and the Foundations of Mathematics, North-Holland Publishing Co., Amsterdam, 1951. · [Zbl 0047.01503](#)
- [36] Sambin Giovanni, Virginia Vaccaro (1988) 'Topology and duality in modal logic', *Ann. Pure Appl. Logic*, 37(3): 249–296 · [Zbl 0643.03014](#) · [doi:10.1016/0168-0072\(88\)90021-8](#)
- [37] Venema Yde (2004) 'A dual characterization of subdirectly irreducible BAOs', *Studia Logica* 77(1): 105–115 · [Zbl 1050.03045](#) · [doi:10.1023/B:STUD.0000034188.80692.46](#)

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.