

## BINARY RELATIONS ON THE MONOID OF $V$ -PROPER HYPERSUBSTITUTIONS

KLAUS DENECKE AND RATTANA SRITHUS

*Universität Potsdam,  
Institute of Mathematics,  
Am Neuen Palais, 14415 Potsdam, Germany*

**e-mail:** kdenecke@rz.uni-potsdam.de

### Abstract

In this paper we consider different relations on the set  $P(V)$  of all proper hypersubstitutions with respect to a given variety  $V$  and their properties. Using these relations we introduce the cardinalities of the corresponding quotient sets as degrees and determine the properties of solid varieties having given degrees. Finally, for all varieties of bands we determine their degrees.

**Keywords:** solid variety, degree of proper hypersubstitutions, isomorphism degree of proper hypersubstitutions.

**2000 Mathematics Subject Classification:** 08B15, 20M07.

### REFERENCES

- [1] St. Burris and H.P. Sankappanavar, *A course in Universal Algebra*, Springer-Verlag, New York, Heidelberg, Berlin 1981.
- [2] K. Denecke and J. Koppitz, *Fluid, unsolid, and completely unsolid varieties*, *Algebra Colloquium* 7:4 (2000), 381–390.
- [3] K. Denecke and R. Marszałek, *Binary Relations on Monoids of Hypersubstitutions*, *Algebra Colloquium* 4:1 (1997), 49–64.
- [4] K. Denecke and S.L. Wismath, *Hyperidentities and clones*, Gordon and Breach Science Publishers, 2000.

- [5] K. Denecke and S.L. Wismath, *Universal Algebra and Applications in Theoretical Computer Science*, Boca Raton, London, Washington, D.C.: Chapman & Hall/CRC 2002.
- [6] K. Denecke, J. Koppitz and R. Srithus, *The Degree of Proper Hypersubstitutions*, preprint 2005.
- [7] K. Denecke, J. Koppitz and R. Srithus, *N-fluid Varieties*, preprint 2005.
- [8] E. Graczyńska, *M-solid Quasivarieties*, preprint 2006.
- [9] E. Graczyńska and D. Schweigert, *The Dimension of a Variety*, preprint 2006.
- [10] J. Koppitz and K. Denecke, *M-solid Varieties of Algebras*, Springer 2006.
- [11] J. Płonka, *Proper and inner hypersubstitutions of varieties*, p. 106–116 in: *Proceedings of the International Conference Sommer School on General Algebra and Ordered Sets*, Olomouc 1994.

Received 26 October 2006

Revised 6 November 2006