

Mal'tsev related properties for normal relations

Diana Rodelo

University of Algarve and CMUC

(joint work with Zurab Janelidze)

We show that Bourn normal relations [1] are difunctional in any Gumm category [2], i.e. any finitely complete category with the categorical version of the Shifting Property [3]. The condition that all relations are difunctional defines Mal'tsev categories, and every Mal'tsev category is a Gumm category. We also discuss the Bourn normal counterpart of other equivalent formulations for Mal'tsev categories. Moreover, we show that the condition that Bourn normal relations are difunctional is a Mal'tsev condition, and we give a syntactical characterisation of the corresponding varieties of universal algebras.

References

- [1] D. Bourn, Normal subobjects and abelian objects in protomodular categories, *Journal of Algebra* 228 (2000) 143-164.
- [2] D. Bourn and M. Gran, Normal sections and direct product decompositions, *Comm. Algebra*. 32(10) (2004) 3825-3842.
- [3] H.P. Gumm, Geometrical methods in Congruence Modular Algebras, *Mem. Amer. Math. Soc.*, vol. 45, 1983.