

Transfer-stable means on finite chains

KURAČ Zbyněk

*Palacky University Olomouc, Faculty of Science, Department of Algebra
and Geometry*

17. listopadu 12, 771 46 Olomouc

Czech Republic

E-mail Kury.Z@seznam.cz

According to [5], the arithmetic mean is a function characterized by four features: it is non-decreasing, idempotent, symmetric and additive. The first three of them can be naturally converted to the theory of posets but the last one generally can not. Due to this problem, we will replace it with another suitable property, which is called transfer-stability. However, we do not get the exact arithmetic mean but some approximation. These functions will be called transfer-stable means.

The first aim of the paper is to show that transfer-stable means on a finite chain form a lattice which is isomorphic to the direct power of a finite chain. The second goal is to create a generating set of transfer-stable means, i.e., means that can generate all other transfer-stable means of the same arity by classical composition of functions. The last goal deals with question of how to generate all transfer-stable means of any arity by binary transfer-stable means only. For this problem we define special transfer-stable means composition.

Acknowledgement

The author was supported by the project of Grant Agency of the Czech Republic (GAČR) no. 18-06915S.

References

- [1] Beliakov G., Bustince H., Calvo T. : *A Practical Guide to Averaging Functions*, Springer, 2016.
- [2] Beliakov G., Pradera A., Calvo T. : *Aggregation Functions: A Guide for Practitioners, Studies in Fuzziness and Soft Computing*, 221, Springer 2007.

- [3] Botur M., Halaš R., Mesiar R., Pócs J. : *On generating of idempotent aggregation functions on finite lattices*, Information Sciences 430–431 (2018), pp. 39–45.
- [4] Bullen P. : *Handbook of means and their inequalities*, Springer Science+Business Media, Dordrecht, 2003.
- [5] Grabisch M., Marichal J. L., Mesiar R., Pap E. : *Aggregation functions*, Cambridge University Press, Cambridge 2009.
- [6] Grätzer G., Wehrung F. : *Lattice Theory: Special Topics and Applications, Volume 1*, Springer, Switzerland 2014.
- [7] Halaš R., Kurač Z., Mesiar R., Pócs J. : *Binary generating set of the clone of idempotent aggregation functions on bounded lattices*, Information Sciences 462 (2018) 367 - 373.
- [8] Halaš R., Pócs J. : *On the clone of aggregation functions on bounded lattices*, Information Sciences 329 (2016) 381 - 389.
- [9] Kolesárová A., Mayor G., Mesiar R. : *Weighted ordinal means*, Information Sciences 177 (2007) 3822 - 3830.
- [10] Kyselová D., Dubois D., Komorníková M., Mesiar R. : *Refining Aggregation Operator-Based Orderings in Multifactorial Evaluation-Part I: Continuous Scales*, Fuzzy Systems IEEE Transactions on, vol. 15, no. 6, pp. 1100 - 1106, 2007.
- [11] Moulin H. : *Axioms of Cooperative Decision Making*, Cambridge, MA: Cambridge Univ. Press, 1988.