

Congruence-simple subsemirings of \mathbb{Q}^+

Vítězslav Kala

e-mail: vita211@gmail.com

Charles University, Prague, Czech Republic

Miroslav Korbelař*

e-mail: miroslav.korbelar@gmail.com

Masaryk University, Brno, Czech Republic

A (commutative) *semiring* is an algebraic structure with two commutative and associative binary operations (an addition and a multiplication) such that the multiplication distributes over the addition.

Commutative congruence-simple semirings have already been characterized with the exception of the subsemirings of \mathbb{R}^+ . Even the class $\mathit{CongSimp}(\mathbb{Q}^+)$ of all congruence-simple subsemirings of \mathbb{Q}^+ has not been classified yet. We introduce a new large class of the congruence-simple saturated subsemirings of \mathbb{Q}^+ . We classify all the maximal elements of $\mathit{CongSimp}(\mathbb{Q}^+)$ and show that every element of $\mathit{CongSimp}(\mathbb{Q}^+) \setminus \{\mathbb{Q}^+\}$ is contained in at least one of them.

REFERENCES

- [1] R. El Bashir, J. Hurt, A. Jančařík, T. Kepka, *Simple commutative semirings*, J. Algebra **236** (2001), 277-306.
- [2] J. S. Golan, *Semirings and their Applications*, Kluwer Academic Publishers, Dordrecht, 1999.
- [3] U. Hebisch and H. J. Weinert, Semirings and semifields. In: *Handbook of Algebra Vol. 1*, Elsevier, Amsterdam, 1996.
- [4] V. Kala, T. Kepka, M. Korbelař, J. D. Phillips, *Various subsemirings of the field \mathbb{Q} of rational numbers*, Acta Univ. Carolinae - Math. and Phys. **50(1)** (2009), 29-59.
- [5] H. S. Vandiver, *Note on a simple type of algebra in which the cancellation law of addition does not hold*. Bull. Amer. Math. Soc. **40** (1934), 916-920.