Quotients in Jordan Systems

Martindale rings of quotients were introduced by W.S. Martindale in 1969 for (associative) prime rings [3]. This concept was designed for applications to rings satisfying a generalized polynomial identity. In 1972, A. Amitsur generalized the construction of Martindale rings of quotients to the setting of semiprime rings. There was a new generalization in 1989 when studying Jordan algebras and triple systems of symmetric elements: K. McCrimmon defined Martindale's quotients for non necessarily semiprime rings, introducing the notion of Martindale rings of quotients relative to a filter of "denominators", see [4]

In [2] we introduce the notion of Jordan system (algebra, pair or triple system) of Martindale-like quotients with respect to a filter of ideals as that whose elements are absorbed into the original system by ideals of the filter, and prove that it inherits regularity conditions such as (semi)primeness and nondegeneracy. When we consider power filters of sturdy ideals, the notions of Jordan systems of Martindale-like quotients and Lie algebras of quotients are related through the Tits-Kantor-Koecher construction, and that allows us to give constructions of the maximal systems of quotients when the original systems are nondegenerate.

In a second work, [1], we prove the existence and give precise descriptions of maximal algebras of Martindale like quotients for arbitrary strongly prime linear Jordan algebras. As a consequence, we show that Zelmanov's classification of strongly prime Jordan algebras can be viewed exactly as the description of their maximal algebras of Martindale-like quotients. As a side result, we show that the Martindale associative algebra of symmetric quotients can be expressed in terms of the symmetrized product, i.e., in purely Jordan terms.

References

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[3] W. S. MARTINDALE, "Prime Rings Satisfying a generalized polynomial identity". J. Algebra. **12** (1969), 576–584.

[4] K. MCCRIMMON, "Martindale Systems of Symmetric Quotients". Algebras, Groups and Geom. 6 (1989), 153–237.