Zentralblatt MATH Review Preview

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Vaš, Lia
Perfect symmetric rings of quotients
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Keywords: Torsion theory; Gabriel filter; ring of quotients; perfect; total.

Review text:

The theory of rings of quotients has its origins between 1930 and 1940, in the works of O. Ore and K. Osano on the construction of the total ring of fractions. In 1956, Y. Utumi introduced the notion of a general ring of quotients [On quotient rings. Osaka Math. J. 8 (1956), 1–18] and proved that there exists a largest general ring of quotients for every ring R called the maximal right ring of quotient $Q^r_{max}(R)$ of R. The general goal of building rings of quotients is to characterize certain types of rings via suitable envelopes. This way, classical rings of quotients $Q^r_{cl}(R)$ embed prime right Noetherian rings into simple and Artinian ones, while Martindale rings of quotients, which were introduced by W.S. Martindale in 1969 for prime rings [Prime Rings Satisfying a generalized polynomial identity. J. Algebra. 12 (1969), 576–584], are used for applications to rings satisfying a generalized polynomial identities.

Every ring of quotients is associated to a Gabriel filter $\mathcal{F}$ of right (or left) ideals (for example, the Gabriel filter associated to the maximal ring of quotients is the set of all dense left ideals), and this make possible to define modules of quotients $M_{\mathcal{F}}$ for every right R-module M. A Gabriel filter is called perfect if for every R-module M we have that $M_{\mathcal{F}} = M \otimes R_{\mathcal{F}}$, where $M_{\mathcal{F}}$ and $R_{\mathcal{F}}$ denote the maximal R-module and the maximal ring of quotients with respect to $\mathcal{F}$ respectively. It is known that every ring R has a largest perfect right ring of quotients, which is denoted by $Q^r_{tot}(R)$. In the paper under review the author defines the symmetric versions of these rings of quotients and proves that every ring R has a largest perfect symmetric ring of quotients, i.e., the total symmetric ring of quotients $Q^\sigma_{tot}(R)$. Moreover, she constructs $Q^\sigma_{tot}(R)$ adapting the Morita's construction of $Q^r_{tot}(R)$ as a sub-ring of $Q^r_{max}(R)$.

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