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## On $p$ -Schreier varieties of semimodules

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### Abstract

In this article, we consider categories of all semimodules over semirings which are  $p$ -Schreier varieties, i.e., varieties whose projective algebras are all free. Among other results, we show that over a division semiring  $R$  all semimodules are projective iff  $R$  is a division ring, prove that categories of all semimodules over proper additively  $\pi$ -regular semirings are not  $p$ -Schreier varieties (in particular, this result solves Problem 1 of Katsov [8]), as well as prove that categories of all semimodules over cancellative division semirings are, in contrast,  $p$ -Schreier varieties. © Taylor & Francis Group, LLC.

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### Keywords

( $p$ )-Schreier varieties, Additively  $p$ -regular semirings, Cancellative semirings, Free and projective semimodules