

## Izvleček

Bodi  $G$  končna grupa in  $K$  polje s karakteristiko  $p > 0$ . Cilj naloge je najti potrebne in zadostne pogoje za polenostavnost križnega produkta  $K_\tau^\alpha G$ .

Na začetku je zapisana teorija, ki je potrebna za razumevanje snovi. Dokazi izrekov iz tega poglavja večinoma niso navedeni.

V nadaljevanju se problem omeji na iskanje pogojev za obstoj ustreznega kocikla  $\alpha$  pri trivialnem delovanju  $\tau$ . Dokazani so potrebni pogoji za obstoj kocikla  $\alpha$ , ki naredi križni produkt  $K_\tau^\alpha G$  polenostaven.

Izkaže se, da so ti pogoji tudi zadostni, če je grupa  $G$  super rešljiva (to je tudi vsaka  $p$ -grupa).

## Abstract

Let  $K$  be any field of characteristic  $p > 0$  and  $G$  a finite group. The purpose of this work is to find necessary and sufficient conditions for the existence of cocycle  $\alpha$  which twists the skew group algebra  $K_\tau G$  to semisimple crossed product  $K_\tau^\alpha G$ .

At the beginning there is background theory. Proofs of the theorems quoted there are mostly omitted.

In chapter two the problem is reduced to crossed products with trivial action  $\tau$ . Necessary conditions for the existence of cocycle  $\alpha$  which makes crossed product  $K_\tau^\alpha G$  simple are provided.

It turns out, conditions are also sufficient if group  $G$  is supersoluble.

**Ključne besede:** polenostavnost, grupna algebra, Maschkejev izrek, poševna grupna algebra, zapentljana grupna algebra, križni produkt, Galoisjeve razširitve, Hochchildova kohomologija, Hochchild-Serovo eksaktno zaporedje

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**Key words:** semisimplicity, group algebra, Maschke's theorem, skew group algebra, twisted group algebra, crossed product, Galois extensions, Hochchild cohomology, Hochchild-Serre exact sequence

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