Hokkaido Mathematical Journal Vol. 8 (1979) p. 228-238

On a transfer theorem for Schur multipliers

By Hiroki SASAKI

(Received October 17, 1978)

1. Introduction.

In this paper we shall give an alternative proof of the following theorem proved by D. F. Holt [3].

THEOREM* (Holt).

Let P be a Sylow p-subgroup of a finite group G, and suppose that P has nilpotency class at most $p/2$. Then the Sylow p-subgroups of the Schur multipliers of G and $N_G(P)$ are isomorphic.

We shall prove this theorem by using the method of cohomological G-functors.

Maps and functors will be written on the right in their arguments, with the corresponding convention for writing composites.

Let G be a finite group and k a commutative ring with identity element.

DEFINITION 1.

A *G-functor* over k is defined to be a quadruple

$$A=(a, \tau, \rho, \sigma),$$

where a, τ, ρ, σ are families of the following kind:

$a=(a(H))$ gives, for each subgroup H of G (notation $H\leq G$), a finitely generated k-module $a(H)$.

$\tau=(\tau_H{}^K)$ and $\rho=(\rho^K{}_H)$ give, for each pair (H, K) of subgroups of G such that $H\leq K$, the respective k-homomorphisms

$$\tau_H{}^K:\ a(H)\rightarrow a(K) \quad \text{and} \quad \rho^K{}_H:\ a(K)\rightarrow a(H).$$

$\sigma=(\sigma_H^g)$ gives, for each pair (H, g) where H is a subgroup of G and g an element in G, the k-homomorphism

$$\sigma_H^g:\ a(H)\rightarrow a(H^g).$$

These families of k-modules and k-homomorphisms must satisfy the following

Axioms for G-functors. (In these axioms, D, H, K, L are any subgroups of G; g, g' are any elements in G.)