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A COUNTEREXAMPLE IN THE GALOIS MODULE STRUCTURE
OF WILD EXTENSIONS OF THE RATIONAL FIELD

by Stephen M. J. WILSON (*)

Abstract

Let K be a finite galois extension of \mathbb{Q} with group \mathcal{G} and let \mathbb{Z}_K be the integers in K . Choose a maximal order \mathfrak{M} containing $\mathbb{Z}^{\mathcal{G}}$. It was conjectured by J. MARTINET, and proved in 1974 by A. FRÖHLICH that if K/\mathbb{Q} is tamely ramified then $[\mathbb{Z}_K \otimes_{\mathbb{Z}^{\mathcal{G}}} \mathfrak{M}] = [\mathfrak{M}]$ in $\mathcal{S}_0(\mathfrak{M})$. In 1975, J. COUGNARD showed that

$$[\mathbb{Z}_K \otimes_{\mathbb{Z}^{\mathcal{G}}} \mathfrak{M}/\text{torsion}] \neq [\mathfrak{M}]$$

in general, but he has subsequently shown that $[\mathbb{Z}_K \otimes_{\mathbb{Z}^{\mathcal{G}}} \mathfrak{M}] = [\mathfrak{M}]$ in many cases.

In this talk an example (with $\mathcal{G} = C_{23} \times D_{18}$) was presented such that both

$$[\mathbb{Z}_K \otimes_{\mathbb{Z}^{\mathcal{G}}} \mathfrak{M}] - [\mathfrak{M}] \quad \text{and} \quad [\mathbb{Z}_K \otimes_{\mathbb{Z}^{\mathcal{G}}} \mathfrak{M}/\text{torsion}] - [\mathfrak{M}]$$

are dependant on the choice of \mathfrak{M} (This statement makes sense as the groups $\mathcal{S}_0(\mathfrak{M})$ for different \mathfrak{M} are canonically isomorphic). In particular, in this example, there exists an \mathfrak{M} such that the two elements are non-zero.

(The full details will shortly be submitted for publication under same title.)

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