بسمه تعالی

تاریخ: ۹۳/۸/۲۲
شماره: ۲/۷۵/۱۵۸۱

دانشگاه خوارزمی
دانشکده علوم ریاضی و کامپیوتر

بیست و چهارمین سمینار جبر ایران

نکوداشت دکتر حسین ذاکری

۲۱-۲۲ آبان ۱۳۹۳ - پردیس کرج

گواهی می شود که جناب آقای سعید جعفری

در بیست و چهارمین سمینار جبر ایران، که در روزهای ۲۱ و ۲۲ آبان ۹۳ در دانشگاه خوارزمی برگزار شد،

شرکت و مبلغ ......۵۰۰ ریال بابت هزینه های سمینار پرداخت نموده است.

ضمناً نامبرده مقاله تحت عنوان

" On rational groups whose irreducible characters vanish only on p-element"

را در این سمینار ارائه نموده است.

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تهران: خیابان شهید مفتح، شمارهٔ ۴۳، دانشگاه خوارزمی، کد پستی: ۱۵۷۱۹-۱۴۹۱۱، تلفن: ۳-۸۸۳۲۹۲۲۰
کرج: خیابان شهید بهشتی، میدان دانشگاه، دانشگاه خوارزمی، کد پستی: ۳۱۹۷۹-۳۷۵۵۱، تلفن: ۰۲۶-۳۴۵۷۹۶۰۰
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Kharazmi University, 24^{th} Iranian Algebra Seminar,
21-22 Aban, 1393 (November 12-13, 2014), pp:85-89

ON RATIONAL GROUPS WHOSE IRREDUCIBLE CHARACTERS VANISH ONLY ON p-ELEMENTS

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ABSTRACT. A finite group whose irreducible complex characters are rational valued is called a rational group. Our aim in this talk is to study the rational groups whose irreducible characters vanish only on p-elements for a prime number p.

This is a joint work with Hesam Sharifi[‡].

1. Introduction

Definition 1.1. *Let G be a finite group, all whose irreducible complex characters are rational valued. Such a group G is called a* **rational group** *or a* **$\mathbb{Q}$-group**.

The importance of studying $\mathbb{Q}$-groups can be deduced, looking at the history of character theory. Some examples of $\mathbb{Q}$-groups are the symmetric groups S_n, Dihedral groups of orders 2, 4, 6, 8, 12, elementary abelian 2-groups and the Weyl groups of the complex Lie algebras. One can find some important properties of $\mathbb{Q}$-groups in [2].

Definition 1.2. *Let G be a finite group and χ be a complex character of G. If $\chi(g) = 0$ for some $g \in G$ then g is called a zero of χ and we say χ vanishes on g.*

In this context, by a character we always mean a complex character. A well-known theorem of Burnside asserts that every nonlinear irreducible character of a finite group H vanishes on some element $h \in H$. More precisely Malle, Navarro and Olsson in [3], have shown that if χ is a nonlinear irreducible character of H then there exists a p-element $h \in H$ such that $\chi(h) = 0$, where p is a prime number dividing the order of H.

Definition 1.3. *Let $H \subseteq F$, with $1 < H < F$. Assume that $H \cap H^x = 1$ whenever $x \in F \setminus H$. Then H is a* **Frobenius complement** *in F. A group which contains a Frobenius complement is called a* **Frobenius group**.

Here we are interested on studying rational groups whose irreducible characters vanish only on p-elements for a fixed prime p. We claim that if a $\mathbb{Q}$-group G satisfies such property then $p = 2$ and G is solvable. Especially we will show, besides the finite elementary abelian 2-groups, every $\mathbb{Q}$-group whose irreducible characters vanish only on involutions, satisfies $G \cong Z(G) \times F$, where F is a Frobenius group with an elementary abelian 3-group as Frobenius kernel and $\mathbb{Z}_2$ as Frobenius complement.

2010 *Mathematics Subject Classification.* 20C15.
Key words and phrases. Rational group, Zero of character, Frobenius group.
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