

## THE RATIONAL CHARACTER TABLE AND QUASI-PERMUTATION REPRESENTATIONS OF THE GROUP $PGL(2, q)$

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By a quasi-permutation matrix we mean a square matrix over the complex field  $\mathbb{C}$  with non-negative integral trace. Thus every permutation matrix over  $\mathbb{C}$  is a quasi-permutation matrix. For a given finite group  $G$ , let  $p(G)$  denote the minimal degree of a faithful permutation representation of  $G$  (or of a faithful representation of  $G$  by permutation matrices), let  $q(G)$  denote the minimal degree of a faithful representation of  $G$  by quasi-permutation matrices over the rational field  $\mathbb{Q}$ , and let  $c(G)$  be the minimal degree of a faithful representation of  $G$  by complex quasi-permutation matrices. In this paper we will calculate  $c(G)$ ,  $q(G)$  and  $p(G)$  where  $G = PGL(2, q)$ . Also in this paper we will give the character table of the irreducible rational representations of  $G = PGL(2, q)$  where  $q = p^n$ ,  $p$  prime,  $n > 0$ , by using the ordinary character table and the Schur indices of  $PGL(2, q)$ .

## ETUDE DE LA MESURABILITE DE LA FONCTION $\circ \cos(2\pi\omega x)$ , OU LES ENTIERS AUDIBLES

Pascal Borde, Labib Haddad

On étudie, suivant la valeur de l'entier illimité  $\omega$ , la mesurabilité au sens de Lebesgue de la fonction qui associe, à chaque réel standard  $x$ , l'ombre  $\circ \cos(2\pi\omega x)$ . On donne aussi l'interprétation des résultats ainsi obtenus en termes classiques d'ultrafiltres.

## CONSTRUCTION D'UN PRODUIT-ETOILE TANGENTIEL SUR LA PARTIE REGULIERE DE $\mathfrak{su}(2)$

Didier Arnal, Mohsen Masmoudi

We construct a tangential star-product on  $\mathfrak{su}(2) \setminus \{0\}$ . This star-product is equivalent to the Lugo-Gutt's one. Components of the equivalence operator are polynomial functions in the variables  $\frac{1}{I}$ ,  $\mathcal{X}$  and  $(I \cdot \Delta)$ , where  $I$  is the invariant polynomial with degree 2 on  $\mathfrak{su}(2)^*$ ,  $\mathcal{X}$  is the dilation vector fields and  $\Delta$  the Laplace operator.

Résumé. On construit un produit-étoile tangentiel sur  $\mathfrak{su}(2) \setminus \{0\}$  équivalent au produit de Lugo-Gutt. Les coefficients de l'opérateur d'entrelacement sont des polynômes en  $\frac{1}{I}$ ,  $\mathcal{X}$  et  $(I \cdot \Delta)$ , où  $I$  est le polynôme invariant de degré 2 de  $\mathfrak{su}(2)^*$ ,  $\mathcal{X}$  est le champ de dilatation et  $\Delta$  est l'opérateur de Laplace.

## THE INFLUENCE OF LINEAR RESTRICTIONS ON THE EQUILIBRIUM POINT IN A NONCOOPERATIVE $n$ -PERSON GAME

Rodica Brânzei

In this paper we study the problem of equilibrium points in a noncooperative  $n$ -person game allowing mixed strategies when these ones are linearly constrained. By using a perturbational method we prove that in certain hypotheses concerning given linear constraints there exists only one  $\varepsilon$ -equilibrium with the property of being the limit of equilibria for any sequence of slight perturbations of this game in the wider family of games with Shannon's entropy.

## MINIMAL MAPPINGS AND FRAGMENTABILITY

A.K. Mirmostafae

In this paper, a property of minimal mappings is used to show that  $X/c_0$ , where  $X$  denotes the Haydon-Zizler subalgebra of  $\ell^\infty$ , is not weakly fragmented by any metric. It follows that  $X/c_0$  does not admit any equivalent convex renorming.

**NONLINEAR ZERO-RANGE POTENTIAL AND HELMHOLTZ RESONATOR**  
**I.Yu. Popov**

Nonlinear zero-range potential is suggested for the description of scattering of sound wave with high amplitude by the Helmholtz resonator. The model is appropriate in the case when the acoustic wave is linear in all domains except the orifice. In the aperture hydrodynamical nonlinear effects are taken into account. Another possible applications of nonlinear zero-range potential are discussed.

**SOME RESULTS ON CANONICAL, CYCLIC HYPERGROUPS AND JOIN SPACES**  
**R.A. Borzoei, A. Hasankhani, H. Rezaei**

In this note, all join spaces associated to fuzzy subsets of a set with three elements, all canonical hypergroups of order 3, spherical join space of order 3 and are characterized.

**$n$ -SKELETON IN THE CATEGORY OF SIMPLICIAL PRESHEAVES**  
**N. Hosseini, Sh. Mousavi**

The standard  $n$ -skeleton functor which is defined on the category of simplicial sets, in which the category of sets is a Boolean topos, is generalized to a functor that is defined on the category of simplicial presheaves, where the category of presheaves is a non-Boolean topos. The generalization is done from three different viewpoints. However it is shown that the three generalized functors are equivalent.

**EXACT CONTROLLABILITY OF DISCRETE DISTRIBUTED DELAYED SYSTEMS WITH DELAYS IN THE CONTROL VARIABLE**  
**M. Rachik, J. Karrakchou, A. Abdelhak**

Inspired by what was done for delayed continuous-time systems (see [1], [2], [3], [4], [7], [8], [9], [20]), we present here a rigorous "state space" formulation for discrete distributed delayed systems. This is used to study the problem of controllability for discrete distributed systems with delays in state and control. We show that, under appropriate uniqueness hypothesis, the optimal control driving the system to a desired given state proceeds from the resolution of an algebraic equation. The reachable set is also characterized.

**DIRECT LIMIT AND INVERSE LIMIT OF JOIN SPACES ASSOCIATED WITH LATTICES**  
**Violeta Leoreanu, Radu Gheorghe**

In this paper, we show that the direct (inverse) limit of a direct (respectively, inverse) family of join spaces associated with modular lattices is a join space associated with a modular lattice.

**RELAXATION IN SHAPE OPTIMIZATION PROBLEMS GOVERNED BY PARABOLIC EQUATIONS**  
**Maciej Smolka**  
no abstract

**WEAK STABILITY AND THE TROTTER-KATO THEOREM**  
**Abd El-Rahman Aly Hussein, Franz Kappel**

In this paper we prove in the context of the Trotter-Kato approximation theorem the assumption of stability of the approximating semigroups can be relaxed if at the same time the consistency requirement is replaced by a stronger assumption. We also include a proof for a 'folk' theorem concerning nonhomogeneous problems which repeatedly appeared in the literature under stronger assumptions than necessary.

## COMPOSITE ASYMPTOTIC REGULARITY AND COMMON FIXED POINTS Mohammad Imdad, Tariq Iqtadar Khan

The concept of compositely asymptotically regular maps is introduced and used to prove common fixed point theorems on complete metric spaces. Our work generalizes some earlier results of Nescic, Guay and Singh, Sharma and Yuel and others.

## ON $H_V$ -SEMIGROUPS Stefanos Spertalis

A wide class of  $H_V$ -semigroups is introduced, obtained from a semigroup  $S$ , using families of non-empty sets. These constructions called  $S$ - $H_V$ -semigroups, are more general than the well known complete semi-hypergroups. The properties of the  $S$ - $H_V$ -semigroups are studied and the fundamental classes are determined. Homomorphisms between  $S$ - $H_V$ -semigroups and complete semi-hypergroups are also investigated.

## NEW SPACES OF LACUNARY SEQUENCES AND INVARIANT MEANS Mursaleen

In this paper we introduce some new sets of lacunary sequences defined by a sequence of moduli which arise from the notion of invariant means. We discuss some topological properties and establish some inclusion relations between these spaces.

## THREE CLASSES OF GENERALIZED STRUCTURES M.R. Molaei, F. Omid

In this paper some methods for constructing generalized groups are introduced. Primary generalized actions and primary topological generalized groups as new structures are also considered.

## GROUP ACTION AND $HX$ -GROUP Zhang Chengyi, Dang Pingan

In this paper, the operational properties of the  $HX$ -group on a finite group are discussed. By the action of the group  $G^*$  on the  $HX$ -group, condition on a subset of the powerset  $P(G)$  to be an  $HX$ -group is studied.

## SOME RESULTS ON GENERALIZED BAER-INVARIANT OF GROUPS Mohammad Reza R. Moghaddam, Mohammad Reza Rismanchian

Let  $\mathcal{V}$  and  $\mathcal{W}$  be two varieties of groups defined by the sets of laws  $V$  and  $W$ , respectively. Then the generalized Baer-invariant with respect to two varieties will be introduced. If  $1 \rightarrow N \rightarrow E \rightarrow G \rightarrow 1$  is a group extension, it is shown that a factor group of  $N$  is a homomorphic image of the generalized Baer-invariant of the group  $G$ . Also the generalized Baer-invariant of the verbal factor group of  $G$  is determined, when the generalized Baer-invariant of  $G$  is trivial. Finally, a wide generalized version of Stallings theorem is obtained.

## MULTIPLICATIVE INTERVAL SEMIGROUPS ON $\mathbb{R}$ ADMITTING HYPERRING STRUCTURE Yupaporn Kemprasit

A semigroup  $S$  is said to *admit a hyperring structure* if there exists a hyperoperation  $+$  on  $S^0$  such that  $(S^0, \oplus, \cdot)$  is a hyperring where  $\cdot$  is the operation on  $S^0$ . In this paper, we characterize multiplicative interval semigroups on  $\mathbb{R}$  admitting hyperring structure where  $\mathbb{R}$  is the set of real numbers.