Non-existence of quasi-symmetric designs with restricted block graphs

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Abstract
Quasi-symmetric designs (QSDs) with particular block graphs are investigated. We rule out the possibility of a QSD with block graph that has the same parameters as that of the Symplectic graph $Sp(2t, q)$, where q is an odd prime power or its complement. We obtain support for Bagchi's recent conjecture, which states that "For the existence of a quasi-symmetric 2-design with block graph $K_{m \times n}$, we must have $m \equiv n + 1 \pmod{n^2}$". Under certain conditions, we rule out the possibility of a QSD having a pseudo-Latin square or negative Latin square block graph.

Keywords Strongly regular graphs · Quasi-symmetric designs · Block graph

Mathematics Subject Classification 05B05

1 Introduction

Let X be a finite set of v elements called points, and β be a set of k-element subsets of X called blocks, such that each pair of points occur in λ blocks, then the pair $\mathbf{D} = (X, \beta)$ is 2-(v, k, λ) *design*. For a 2-(v, k, λ) design $\mathbf{D}$, the number of blocks containing α in X is r, which is independent of α. The number of blocks in $\mathbf{D}$ is denoted by b.

An integer λ_1, $0 \leq \lambda_1 < k$, is an *intersection number* of $\mathbf{D}$ if there exist $B, B' \in \beta$ such that $|B \cap B'| = \lambda_1$. Symmetric designs have exactly one intersection number.

Quasi Symmetric Designs

Yury J. Ionin,Mohan S. Shrikhande

Quasi Symmetric Designs:

    Quasi-symmetric Designs Mohan S. Shrikhande,Sharad S. Sane,1991 The authors discuss comprehensively the generalization of results and applications to quasi symmetric designs   *Quasi-symmetric Designs* Mohan S. Shrikhande,Sharad S. Sane,1991-11-29 Design theory is a branch of combinatorics with applications in number theory coding theory and geometry In this book the authors discuss the generalization of results and applications to quasi symmetric designs The coverage is comprehensive and will be useful for researchers and graduate students An attractive feature is the discussion of unsolved problems   **Combinatorics of Symmetric Designs** Yury J. Ionin,Mohan S. Shrikhande,2006-05-25 The aim of this book is to provide a unified exposition of the theory of symmetric designs with emphasis on recent developments The authors cover the combinatorial aspects of the theory giving particular attention to the construction of symmetric designs and related objects The last five chapters of the book are devoted to balanced generalized weighing matrices decomposable symmetric designs subdesigns of symmetric designs non embeddable quasi residual designs and Ryser designs Most results in these chapters have never previously appeared in book form The book concludes with a comprehensive bibliography of over 400 entries Researchers in all areas of combinatorial designs including coding theory and finite geometries will find much of interest here Detailed proofs and a large number of exercises make this book suitable as a text for an advanced course in combinatorial designs   **Quasi-symmetric Designs** Marianne Heafield,1992   On Quasi-symmetric Designs Soon-teck Tan,1978   **On Quasi-symmetric Designs** Soon-Teck Tan,1978   Handbook of Combinatorial Designs Charles J. Colbourn,Jeffrey H. Dinitz,2006-11-02 Continuing in the bestselling informative tradition of the first edition the Handbook of Combinatorial Designs Second Edition remains the only resource to contain all of the most important results and tables in the field of combinatorial design This handbook covers the constructions properties and applications of designs as well as existence   CRC Handbook of Combinatorial Designs Charles J. Colbourn,2010-12-12 From experimental design to cryptography this comprehensive easy to access reference contains literally all the facts you need on combinatorial designs It includes constructions of designs existence results and properties of designs Organized into six main parts the CRC Handbook of Combinatorial Designs covers   **Designs and Their Codes** E. F. Assmus,J. D. Key,1994-01-06 A self contained account suited for a wide audience describing coding theory combinatorial designs and their relations   **Design Theory** Thomas Beth,Deiter Jungnickel,Hanfried Lenz,1999 This is the first volume of the second edition of the standard text on design theory Since the first edition there has been extensive development of the theory and this book has been thoroughly rewritten and extended during that time In particular the growing importance of discrete mathematics to many parts of engineering and science have made designs a useful tool for applications It is suitable for advanced courses and as a reference work not only for researchers in discrete mathematics or finite algebra but also for those working in computer and communications engineering and other mathematically oriented disciplines Exercises are

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Information Security, Coding Theory and Related Combinatorics Dean Crnković,Vladimir Tonchev,2011 Published in cooperation with NATO Emerging Security Challenges Division T p **Network Coding and Subspace Designs** Marcus Greferath,Mario Osvin Pavčević,Natalia Silberstein,María Ángeles Vázquez-Castro,2018-01-29 This book written by experts from universities and major research laboratories addresses the hot topic of network coding a powerful scheme for information transmission in networks that yields near optimal throughput It introduces readers to this striking new approach to network coding in which the network is not simply viewed as a mechanism for delivering packets but rather an algebraic structure named the subspace which these packets span This leads to a new kind of coding theory employing what are called subspace codes The book presents selected highly relevant advanced research output on Subspace Codes and Rank Metric Codes Finite Geometries and Subspace Designs Application of Network Coding Codes for Distributed Storage Systems The outcomes reflect research conducted within the framework of the European COST Action IC1104 Random Network Coding and Designs over GF q Taken together they offer communications engineers R D engineers researchers and graduate students in Mathematics Computer Science and Electrical Engineering a comprehensive reference guide to the construction of optimal network codes as well as efficient encoding and decoding schemes for a given network code *Number Theory and Discrete Mathematics* A.K. Agarwal,Bruce C. Berndt,Christian F. Krattenthaler,Gary L. Mullen,K. Ramachandra,Michel Waldschmidt,2012-12-06 To mark the World Mathematical Year 2000 an International Conference on Number Theory and Discrete Mathematics in honour of the legendary Indian Mathematician Srinivasa Ramanuj was held at the centre for Advanced study in Mathematics Panjab University Chandigarh India during October 2 6 2000 This volume contains the proceedings of that conference In all there were 82 participants including 14 overseas participants from Austria France Hungary Italy Japan Korea Singapore and the USA The conference was inaugurated by Prof K N Pathak Hon Vice Chancellor Panjab University Chandigarh on October 2 2000 Prof Bruce C Berndt of the University of Illinois Urbana Chaimpaign USA delivered the key note address entitled The Life Notebooks and Mathematical Contributions of Srinivasa Ramanujan He

described Ramanujan as one of this century s most influential Mathematicians Quoting Mark K ac Prof George E Andrews of the Pennsylvania State University USA in his message for the conference described Ramanujan as a magical genius During the 5 day deliberations invited speakers gave talks on various topics in number theory and discrete mathematics We mention here a few of them just as a sampling M Waldschmidt in his article provides a very nice introduction to the topic of multiple poly logarithms and their special values C **Designs From Linear Codes (Second Edition)** Cunsheng Ding,Chunming Tang,2021-12-20 Since the publication of the first edition of this monograph a generalisation of the Assmus Mattson theorem for linear codes over finite fields has been developed two 70 year breakthroughs and a considerable amount of other progress on t designs from linear codes have been made This second edition is a substantial revision and expansion of the first edition Two new chapters and two new appendices have been added and most chapters of the first edition have been revised It provides a well rounded and detailed account of t designs from linear codes Most chapters of this book cover the support designs of linear codes A few chapters deal with designs obtained from linear codes in other ways Connections among ovals hyperovals maximal arcs ovoids special functions linear codes and designs are also investigated This book consists of both classical and recent results on designs from linear codes It is intended to be a reference for postgraduates and researchers who work on combinatorics or coding theory or digital communications or finite geometry It can also be used as a textbook for postgraduates in these subject areas Related Link s **Designs and Finite Geometries** Dieter Jungnickel,2012-12-06 Designs and Finite Geometries brings together in one place important contributions and up to date research results in this important area of mathematics Designs and Finite Geometries serves as an excellent reference providing insight into some of the most important research issues in the field *Finite Geometries and Combinatorial Designs* Earl Sidney Kramer,1990 The proceedings of an AMS special session on finite geometries and combinatorial designs Topics range over finite geometry combinatorial designs their automorphism groups and related structures **Encyclopaedia of Mathematics** Michiel Hazewinkel,2012-12-06 This is the second supplementary volume to Kluwer s highly acclaimed eleven volume Encyclopaedia of Mathematics This additional volume contains nearly 500 new entries written by experts and covers developments and topics not included in the previous volumes These entries are arranged alphabetically throughout and a detailed index is included This supplementary volume enhances the existing eleven volumes and together these twelve volumes represent the most authoritative comprehensive and up to date Encyclopaedia of Mathematics available Coding Theory and Applications Raquel Pinto,Paula Rocha Malonek,Paolo Vettori,2015-07-24 The topics covered in this book written by researchers at the forefront of their field represent some of the most relevant research areas in modern coding theory codes and combinatorial structures algebraic geometric codes group codes quantum codes convolutional codes network coding and cryptography The book includes a survey paper on the interconnections of coding theory with constrained systems written by an invited speaker as well as 37 cutting edge research communications presented

at the 4th International Castle Meeting on Coding Theory and Applications 4ICMCTA held at the Castle of Palmela in September 2014 The event s scientific program consisted of four invited talks and 39 regular talks by authors from 24 different countries This conference provided an ideal opportunity for communicating new results exchanging ideas strengthening international cooperation and introducing young researchers into the coding theory community

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