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References; Linear Codes over Finite Chain Rings and Projective Hjelmslev Geometries T. Honold and 1. Landjev; 1. Introduction; 2. Modules over Finite Chain Rings; 2.1. Finite Chain Rings; 2.2. Structure of Finite Modules; 2.3. Free Modules
2.4. Counting Formulas3. Linear Codes over Finite Chain Rings; 3.1. Basic properties; 3.2. Code Spectra and Isomorphisms; 3.3. Mac Williams Identities; 4. Projective and Affine Hjelmslev Spaces; 4.1. Axiomatic Definition; 4.2. Coordinate Hjelmslev Geometries; 4.3. Multisets of Points in PHG(R~); 5. Linear Codes and Geometry; 5.1. Equivalence of Multisets of Points and Linear Codes; 5.2. Some Classes of Codes Defined Geometrically; 5.3. Generalized Gray Maps; 5.4. Linearly Representable Codes; 5.5. Homogeneous Weights and Strongly Regular Graphs; 6. Arcs in Projective Hjelmslev Planes
6.1. A General Upper Bound for the Size of an Arc6.2. Constructions for Arcs; 6.3. (k,2)-Arcs; 6.4. Dual Constructions; 6.5. Constructions Using Automorphisms; 6.6. Tables for Arcs in Geometries over Small Chain Rings; 7. Blocking Sets in Projective Hjelmslev Planes; 7.1. General Results; 7.2. Redei Type Blocking Sets; Acknowledgements; Bibliography; Foundations of Linear Codes Defined over Finite Modules: The Extension Theorem and the MacWilliams Identities 1. A. Wood; 1. Introduction; 2. Characters; 2.1. Basic results; 2.2. Additive form of characters; 2.3. Character modules
3. Finite rings3.1. Basic definitions; 3.2. Structure of finite rings; 3.3. Duality; 4. Mobius functions of posets; 4.1. Basic definitions; 4.2. Examples; 5. Linear codes over modules; sufficient conditions for the extension theorem; 5.1. Basic definitions; 5.2. The character module as alphabet: the case of Hamming weight; 5.3. Sufficient conditions: the case of Hamming weight; 5.4. Sufficient conditions: the case of rings; 5.5. Semi-linear transformations; 6. Necessary conditions for the extension theorem; 6.1. Statement of results; 6.2. Proof of Theorem 6.3
6.3. The strategy of Dinh and Lopez-Permouth and proofs of necessary conditions

Sommario/riassunto

This is the proceedings volume of the International Centre for Pure and Applied Mathematics Summer School course held in Ankara, Turkey, in August 2008. Contributors include Bozta?, Udaya, Dinh, Ling, Lopez-Permouth, Szabo, Honold, Landjev and Wood. The aim is to present a survey in fundamental areas and highlight some recent results.