
Editorial

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Biographical notes: Philippe Gaborit received a PhD at the University of Bordeaux in 1997. After a two years post-doc with Vera Pless in Chicago, he became an Associate Professor at the University of Limoges in 1999, and a Professor in 2008. His main research interests are cryptography, coding theory and security.

Jon-Lark Kim received the BS in Mathematics from POSTECH, Pohang, Korea, in 1993, the MS in Mathematics from Seoul National University, Korea, in 1997, and the PhD in Mathematics from the University of Illinois at Chicago, in 2002 under the guidance of Prof. Vera Pless. From 2002 to 2005, he was with the Department of Mathematics at the University of Nebraska-Lincoln as a Research Assistant Professor. Since 2005, he has been an Assistant Professor in the Department of Mathematics at the University of Louisville, Louisville, KY. He was awarded a 2004 Kirkman Medal of the Institute of

Combinatorics and its Applications. He is a Member of the Editorial Board of the *Int. J. Information and Coding Theory*. His areas of interest include algebraic coding theory and its applications to quantum coding, network coding and biological coding.

Patrick Solé received the Ingénieur and Docteur-Ingénieur degrees both from Telecom ParisTech, Paris, France, in 1984 and 1987, and the habilitation à diriger des recherches from the Université de Nice-Sophia Antipolis, France in 1993. He has held visiting positions in Syracuse University, Syracuse, NY, from 1987 to 1989, Macquarie University, Sydney, Australia, from 1994 to 1996, Lille University, Lille, France, from 1999 to 2000. From 1989 till 2009, he was a permanent member of the CNRS Laboratory I3S, Sophia Antipolis, France, with the rank of Directeur de Recherche since 1996. In 2009, he joined Telecom ParisTech, LTCI. His research interests include coding theory (covering radius, codes over rings, convolutional codes), interconnection networks (graph spectra, expanders), vector quantisation (lattices) and cryptography (pseudorandom sequences). He is the recipient (jointly with Hammons, Kumar, Calderbank and Sloane) of the IEEE Information Theory Society Best Paper Award for 1995.

Isaac Woungang received his MSc and PhD, all in Mathematics from the Université du Sud, Toulon-Var, Toulon, France, in 1990 and 1994, respectively. In 1999, he received a MSc from INRS-Énergie, Matériaux et Télécommunications, University of Quebec in Montreal, Montreal, Canada. From 1999 to 2002, he worked as a Software Engineer at Nortel Networks, Ottawa, Canada. Since 2002, he has been with Ryerson University, where he is now an Associate Professor of Computer Science. In 2004, he founded the Distributed Applications and Broadband Networks Laboratory (DABNEL) R&D group, hosted at Ryerson University. His research interests include network security, computer communication networks, mobile communication systems and coding theory.

Professor Vera Pless has been preeminent in the development of much of the algebraic theory of error-correcting codes. She is well-known for ‘Pless power moments’ which are an infinite family of equations relating the weight distribution of the code to the weight distribution of its dual code. This family, although equivalent to the MacWilliams equations, is particularly useful in showing uniqueness of certain solutions. She is the first person to start the classification of binary self-dual codes in 1972 and also find the Pless symmetry codes and new 5-designs in 1972. This classification problem has expanded to the classification of self-dual codes over finite fields and finite rings, one of the most active research areas.

Professor Vera Pless attended the University of Chicago at age 15 and received her PhD from Northwestern University in 1957 with a thesis on ring theory. After teaching at Boston University and researching at the Air Force Cambridge Research Laboratory, she joined the Department of Mathematics, Statistics and Computer Science at the University of Illinois at Chicago as a Full Professor in 1975 and taught there until her retirement in 2005. She has three children Nomi, Ben and Dan and three grandchildren.

She is the author of the well-known textbook *An Introduction to the Theory of Error-Correcting Codes* and coeditor of *Handbook of Coding Theory* and *Fundamentals of Error-Correcting Codes* with W. Cary Huffman. She published more than 100 research papers independently or with Sloane, Conway and Assmus. Currently, she is in the Editorial Board of *Journal of Combinatorial Theory, Series A and Finite Fields and Their*

Applications. She had 11 PhD students including Jon-Lark Kim and Xiang-Dong Hou in this special issue. She had three post-docs including Philippe Gaborit and Keith Mellinger in this special issue. She invited Patrick Solé for seminar talks and research collaboration.

We would like to mention one anecdote related to Vera. She had a small heart attack during the AMS-MAA joint meeting at Atlanta in January, 2005. She went to the hospital immediately. Steven Dougherty, Reshma Ramadurai and Jon-Lark Kim visited her at the ward as they were at the conference as well. As soon as Vera saw Reshma, one of her master students from India, she said regretfully “Reshma, I might not teach the class for the first week”. Later when the nurse entered, she was very surprised to see three people of such diverse age race and looks. Steven said to Vera “the nurse thinks that we are your children and that must be one strange gene pool”. Then, Vera proceeded to grill the doctor on her condition as if it were a thesis defense. Finally, there were two doctors in the room and her daughter, who is a doctor, on the phone. Vera then ran a series of questions to all three doctors about her condition, demanding precise terminology for everything they said. After seven months, Vera retired.

In 2006, W. Cary Huffman and Jon-Lark Kim organised a special session on *Algebraic Coding Theory – Honouring the Retirement of Vera Pless* at AMS sectional meeting at Cincinnati. Vera’s son, colleagues and students participated for the meeting and enjoyed the memorable moment. It brings this special issue of the *Int. J. Information and Coding Theory (IJICoT)* on ‘Algebraic and Combinatorial Coding Theory’, in Honor of the Retirement of Vera Pless. We accepted 18 papers in this special issue after a thorough and a critical review process by experts in the field. These papers are grouped into three Series, all in 2010.

The first paper in this Series, titled ‘Binary divisible codes of maximum dimension’ is authored by Xiaoyu Liu. Under the assumption that a certain non-zero weight exists, the author has provided an exact upper bound for the dimension of binary divisible codes in terms of code length and divisibility level when this level is at least equal to three. The uniqueness up to equivalence of the code attaining this bound, as well as the validation of the above-mentioned assumption for level three divisible codes of maximum dimension with relatively short lengths, are proved.

The second paper in this Series, titled ‘Classes of permutation arrays in finite projective spaces’, is authored by T.L. Alderson and Keith E. Mellinger. The authors have provided some techniques for constructing permutation arrays using projections in finite projective spaces and the geometry of arcs in the finite projective plane. Using these techniques, the authors have derived examples of codes for certain parameter sets, for which no constructions were previously known.

The third paper in this Series, titled ‘Self-dual bent functions’, is authored by Claude Carlet, Lars Eirik Danielsen, Matthew G. Parker and Patrick Solé. The authors have proposed a spectral characterisation in terms of the Rayleigh quotient of the Sylvester Hadamard matrix. They have also studied Boolean functions in an odd number of variables and have determined some bounds on the Rayleigh quotient for these functions. Finally, they have proposed an efficient search algorithm based on the spectrum of the Sylvester matrix, resulting to primary and secondary constructions of all self-dual bent Boolean functions in less or equal to six variables, as well as all quadratic self-dual bent Boolean functions in eight variables, up to a restricted form of affine equivalence.

The fourth paper in this Series, titled ‘New results on s -extremal additive codes over $GF(4)$ ’, is authored by Zlatko G. Varbanov. This paper studies s -extremal additive codes

over $\text{GF}(4)$. The author has constructed new s -extremal codes with minimum distance d , where $d > 5$. When $d = 5$, a classification of such codes of length 13 is provided, and 1,075 new codes of length 14 are constructed. When $d = 6$, a classification of the codes of length 14 is provided, and five new codes of length 15 are derived. Finally, when $d = 7$, four new codes of length 19 are constructed.

The fifth paper in this Series, titled ‘A selection of divisible lexicographic codes’, is authored by Harold N. Ward. The author presented a selection of lexicographic codes over a prime field $\text{GF}(p)$, constructed so as to be linear and to have a prescribed minimum distance and divisor. The author also argued on how the development of such codes when the minimum distance is $3p$ and the divisor is p would lead to questions involving the distribution of quadratic residues and non-residues modulo p .

The last paper in this Series, titled ‘Anti-isomorphisms, character modules and self-dual codes over non-commutative rings’, is authored by Jay A. Wood. The author argued on the following ideas of Nebe, Rains and Sloane: “By assuming the existence of an anti-isomorphism on a finite ring and by assuming that a module alphabet has a well-behaved duality, one is able to study self-dual codes defined over alphabets that are modules over a non-commutative ring”. Several illustrative examples are given to validate the arguments.

We hope that readers will enjoy reading these papers and find them valuable. The readers are encouraged to contact the authors, if they need any further clarification regarding their works presented. We take this opportunity to express a few words of our thankfulness. We would like to thank all the authors for considering *IJCoT* as a medium for publishing their work. Also, we are very much thankful to many thoughtful, diligent and timely referees for their support in reviewing all the papers.