
Editorial

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Biographical notes: Philippe Gaborit received a PhD from 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 his BS in Mathematics from POSTECH, Pohang, Korea, in 1993, an MS in Mathematics from Seoul National University, Korea, in 1997 and a 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 to 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 an MAsc 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 DABNEL (the Distributed Applications and Broadband Networks Laboratory) 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 to 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.

She attended the University of Chicago at the age of 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”. Vera then proceeded to grill the doctor on her condition as if it were a thesis defence. 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 (IJCoT)* on *Algebraic and Combinatorial Coding Theory*, in Honour 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.

In this second Series of papers, the first paper is titled, ‘Cyclic \mathbb{F}_q -linear \mathbb{F}_{q^t} -codes’, and is authored by W. Cary Huffman. This paper introduced a natural generalisation of additive codes to \mathbb{F}_q -linear \mathbb{F}_{q^t} -codes. The author has developed the theory of these codes when they are cyclic. A method for counting them is also provided. In addition, these codes are endowed with two different trace inner products, and counts for the number of self-orthogonal and self-dual cyclic codes under each of these inner products are given. The authors have investigated some properties of power permutations. They have derived the relationship between the differential spectrum of a power permutation and the weight enumerator of a cyclic code with two zeroes. They have also studied functions with a two-valued differential spectrum and have been able to compute the differential spectra of several infinite families of exponents.

The second paper in this Series, is titled ‘Algebraic constructions of LDPC codes with no short cycles’, and is authored by Ted Hurley, Paul McEvoy and Jakub Wenus. The authors proposed an algebraic group ring method for constructing codes with no short cycles in the check matrix. From this technique, they also derived a general method for constructing and analysing low density parity check (LDPC) codes with no short cycles from group rings. Illustrative examples of LDPC codes are constructed from group ring elements and compared against known LDPC codes, including those adopted for wireless standards.

The third paper in this Series, titled ‘Codes from Riemann-Roch spaces for $y^2 = x^p - x$ over $\text{GF}(p)$ ’, is authored by Darren Glass, David Joyner and Amy Ksir. In this paper, the authors computed explicit F -bases for the Riemann-Roch space of D , where D is a G -invariant divisor on $X(F)$, X is the hyperelliptic curve $y^2 = x^p - x$ over a field F of

characteristic p and $G = \text{PSL}(2, p)$ is the automorphism group of X . They also computed G -module decompositions in many cases, resulting to the construction of a family of AG codes with good parameters and large automorphism group.

The fourth paper in this Series, titled ‘Minimum distance and pseudodistance lower bounds for generalised LDPC codes’, is authored by Christine A. Kelley. The author has investigated two alternative ways of constructing generalised low-density parity-check codes. New lower bounds on the minimum distance, stopping distance and pseudo distance are derived for these codes using graph-based analysis.

The last paper in this Series, titled ‘Codes associated with triangular graphs, and permutation decoding’, is authored by J.D. Key, J. Moori and B.G. Rodrigues. The authors have studied linear codes which are obtained from designs associated with the complete graph on n vertices and its line graph, as well as the triangular graph. They have determined the parameters of the codes and their automorphism groups for any odd prime. They have also provided a method for finding the PD-sets within the symmetric group S_n for full permutation decoding, for all primes and for all integers n greater than or equal to 6.

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.