



THE CHINESE UNIVERSITY OF HONG KONG
Institute of Network Coding
and
Department of Information Engineering
Seminar



Algebraic-geometric Codes and Modernized Algebraic Decoding

by

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Date : 20 January 2011 (Thursday)

Time : 2:30 - 3:30 pm

**Venue : Room 833, Ho Sin Hang Engineering Building
The Chinese University of Hong Kong**

Abstract

Algebraic-geometric (AG) code has long been identified as a possible candidate to replace the Reed-Solomon (RS) code for error correction in both wireless communications and storage devices. In this presentation, the construction of an AG code will be introduced with a discussion of its application advantages. An algebraic soft decoding (ASD) algorithm is designed for the AG code. With an error-correction capability beyond the half distance boundary, the ASD algorithm is one of the most powerful decoding algorithms with a moderate decoding complexity. For implementation, a number of complexity reduction approaches will also be introduced. Performance on ASD decoding of AG code will be shown, comparing with RS codes defined in different sizes of finite field.

Aiming to engineer the algorithm, this presentation will also introduce a modernized ASD algorithm, named the progressive ASD (PASD) algorithm. It is shown instead of performing the complexity dominated interpolation process with a fixed decoding parameter, the ASD algorithm can be performed in an iterative way, enhancing its decoding capability progressively. Like most of the modern decoding approaches, for example, the belief propagation (BP) algorithm, the PASD algorithm can smartly adjust both of its decoding capability and complexity according to the quality of the received information. Surprisingly, more than reducing the decoding complexity, the PASD algorithm can also slightly outperform the existing ASD algorithm. This thanks to its ability of sensitively identifying the successful decoding event.

Biography

Dr Li Chen received his BSc degree in applied physics from Jinan University, P. R. China in 2003, MSc degree in communications and signal processing and PhD degree in mobile communications in 2004 and 2008 respectively, both from Newcastle University, United Kingdom. He was a recipient of the British Overseas Research Scholarship (ORS). From 2007 to 2010, he was a research associate with Newcastle University, carrying out an Engineering and Physical Sciences Research Council (EPSRC) project collaborated with Cambridge University. From 2010, he joined Sun Yat-sen University of China as a lecturer. He is currently a principle investigator for a National Natural Science Foundation of China (NSFC) project. His primary research interests include: channel coding, information theory and cooperative communications.

****ALL ARE WELCOME ****