



Center for Magnetic Recording Research  
**SEMINAR**

**Thursday, May 27, 2010**  
**2:00 PM – CMRR Auditorium**

**Perfect (or CAZAC) Roots-of-Unity Sequences: A Closed-Form Unified Construction with Application to Low-PAPR Channel Sounding**

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**Abstract:**

Perfect Roots-of-Unity Sequences (PRUS), sometimes called the Constant Amplitude Zero Auto Correlation (CAZAC) sequences, are defined by the property of having a perfect impulse like periodic autocorrelation function. As combinatoric objects, they are equivalent to the class of circulant Hadamard matrices with elements being some complex roots of unity. As their well-known special cases, the Frank and Chu sequences have been adopted as radar/ranging codes, synchronization preambles, as well as channel sounding sequences. A large number of constructions of such sequences have been discovered and rediscovered for a wide range of applications in the past. In this talk, I shall present a closed-form unified construction for such sequences. The result allows those CAZAC sequences that best satisfy a given application-specific requirements to be searched more efficiently. As an application example, I shall present of how the CAZAC-based sounding sequences with low peak-to-average-power ratios suitable for OFDM-based wireless systems (e.g. IEEE802.22) can be efficiently obtained.

**Bio:**

Wai Ho MOW received his PhD degree in Information Engineering from the Chinese University of Hong Kong. He was a visiting research fellow at the University of Waterloo in Canada, the Munich University of Technology (TUM) in Germany, and the Kyoto University in Japan in 1995, 1996 and early 2000, respectively. From 1997 to 1999, he was an assistant professor at the Nanyang Technological University, Singapore. He joined the Hong Kong University of Science and Technology since 2000 and is currently spending his sabbatical at the Center for Magnetic Recording Research, UC San Diego. He was the recipient of the Croucher Research Fellowship (HK), the Humboldt Research Fellowship (Germany), the Telecommunications Advancement Research Fellowship (Japan), the Tan Chin Tuan Academic Exchange Fellowship (Singapore), the Wong Kuan Cheng Education Foundation Academic Exchange Award (China), the Foreign Expert Bureau Fellowship (China) and the Royal Academy of Engineering Award for Short Research Exchanges with China and India (UK). His research interests are in the areas of wireless communications, coding and information theory. He pioneered the lattice approach to signal detection problems and unified all known constructions of perfect roots-of-unity sequences (widely used as CAZAC preambles and radar signals). Since Jun 2002, he has been the principal investigator of over 10 funded research projects. He has published 1 book, and co-authored over 20 filed patent applications and over 100 technical publications, among which he is the sole author of over 40. He co-authored a paper that received the ISITA2002 Paper Award for Young Researchers and supervised one student who won the first prize in the IEEE HK Section Postgraduate Paper Contest. He was the chair of the Hong Kong Chapter of the IEEE Information Theory Society in 2005. He was a technical program co-chair of 5 conferences and served the technical program committees of many conferences such as Globecom, ICC, ISITA, ITW, VTC and WCNC. He was the guest (associate) editor for 3 special issues of the IEICE Transactions on Fundamentals. He was a member of the Radio Spectrum Advisory Committee, Office of the Telecommunications Authority, the Hong Kong S.A.R. Government from 2003 to 2008.

If you have any questions or, time permitting, would like to meet with the speaker, contact him at [eewhmow@ust.hk](mailto:eewhmow@ust.hk) / Phone 858-534-6214).

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