October 18, 2005

06pims008: Sequences and Codes

Organizers:

Boston, Nigel, University of Wisconsin - Madison, boston@math.wisc.edu
Calderbank, Robert, Princeton University, calderbk@math.princeton.edu
Jedwab, Jonathan, Simon Fraser University, jed@sfu.ca

Location:

Simon Fraser University

PIMS Sites:

Simon Fraser University

Objectives:

Our purpose is to explore new research directions within the fields of sequence design and algebraic error-correcting codes. Specific topics include radar applications of sequence design, especially Golay pairs; algebraic constructions of space-time codes; and network coding. We aim to bring together mathematicians and engineers, and to increase the pool of young researchers who appreciate the power of mathematics and the important role that it plays in engineering disciplines. We will also host a broad forward-looking discussion that will address identification of outstanding problems, the different forms of publication in constructive combinatorics, and reward systems across industry and academia.

Comments:

With the growing interest in interdisciplinary mathematics, there have been several crossover conferences with mathematicians, electrical engineers, and computer scientists where the theme has been cryptography or coding theory. Last academic year, two of the organizers (NB,RC) taught courses describing recent, newer applications of algebra (www.math.wisc.edu/~boston/842.html). This conference likewise seeks to promote interest in these broader uses of advanced algebra, number theory, and combinatorics.

In parallel with the conference, Rob Calderbank will give a mini-series of expository lectures on Heisenberg-Weyl groups and their application to sequence design. These open lectures will widen the scope of the conference by including interested mathematicians and engineers from the wider university communities of Vancouver.

Audience:

The audience will consist of mathematicians interested in the new challenges that this part of discrete mathematics provides, together with computer scientists and electrical engineers looking for new approaches to use against the practical problems they encounter. This will include both current practitioners and graduate students looking to establish themselves in an emerging area. The meeting will be held the week after both the IEEE's ISIT 2006 (in Seattle) and the 9th meeting of the Canadian Number Theory Association (in Vancouver), making it easier to attract the intended audience.

Participants:

The organizers of Sequences and Codes will identify, attract and involve a diversity of about 50-60 participants. Plenary speakers will be drawn from the following list of target participants organized by academic interest. Stephen Howard (Radar signal processing) and Ralf Koetter (Network coding) have accepted our invitation to give plenary talks and we are in the process of securing three remaining plenary speakers, probably Belfiore, Lagarias, and Shokrollahi.

Radar Signal Processing and Compressed Sensing: S. Howard, W. Moran, R. Novak, E. Candes, D. Donoho, A. Gilbert, M. Strauss, I. Daubechies, J. Tropp, B. Werness (Princeton undergraduate), J. Benedetto, J. Zhou.
Wireless Communication (including signal processing for OFDM): V. Kumar, V. Tarokh, C. Tellambura, E. Soljanin, L. Cimini, R. Blum, R. Laroia, P. Viswanath, H. El Gamal, M. Damen, J.-C. Belfiore, E. Viterbo, G. Rekaya, F. Oggier.
Number Theory: P. Borwein, S. Choi, B. Saffari, S. Eliahou, M. Kervaire, E. Bayer-Fluckiger, F. Voloch, O. Yilmaz, S. Gunturk, J. Brillhart.
Design Theory: J. Davis, A. Pott, D. Jungnickel, J. Key, Q. Xiang, J. Dillon, R. Wilson, C. Colbourn, J. Dinitz, K. Horadam, F. Fiedler, L. Batten.
Sequences: T. Helleseth, T. Klove, M. Parker, T. Hoholdt, P. Sole, J. Wolfmann, R. Roth
Mathematics at the Interface of Algebra, Coding Theory and Applications in Engineering: J. Walker, A. Barg, V. Tonchev, A. Ashikhmin, W. Kewlin (undergraduate, Germany), Sethuraman, I. Duursma, R. Pellikaan, J. Rosenthal, N.J.A. Sloane, E. Rains.

Amount Requested:

32000.00

Expenditures:

$ 2000 Conference support services from IRMACS
$ 4000 Support for conference dinner
$ 500 Support for conference excursion to Vancouver
$ 3500 Technical conference support including publicity, printing, and duplication
$ 4000 Conference refreshments at technical breaks
$10000 Travel and local expenses for 5 invited speakers (1 Australia, 1 Switzerland, 3 US)
$34000 Travel and local expense support for graduate students and postdoctoral fellows
$ 3000 Adminstrative support

Total: $61,000

Income:

$32000 PIMS
$ 5000 SFU Conference grant program, Mathematics Department
$ 5000 MITACS
$ 2000 NSERC Discovery Grant, J.Jedwab
$12000 NSF (= $10,000 US) (R.Calderbank applying - for US participants)
$ 5000 Registration fees (estimated) to support conference events, including the dinner

Total: $61,000

Selected Dates:

Mon, July 17, 2006
Fri, July 21, 2006