THE CHINESE UNIVERSITY OF HONG KONG
Department of Information Engineering
and
IEEE Information Theory Society Hong Kong Chapter
Seminar

In Favour of Posting

Single-Output Two-Way Channels and the Dependence Balance Bound

by

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Date : 7 July 2026 (Tuesday)
Time : 10:30am – 11:30am
Venue : ERB513, 5/F, William MW Mong Engineering Building

Abstract

A challenging problem in multi-user information theory is that of determining the capacity region of the two-way channel (TWC). In 1961 Shannon proposed this problem and found an inner and an outer bound for this capacity region. In general these bounds do not coincide. A well known TWC for which the bounds are different is the binary multiplying channel (BMC). For the BMC Schalkwijk (1982,1983) constructed coding schemes that exceed Shannon's inner bound. Hekstra and Willems (1989) derived an upper bound for the capacity region for single out TWC's, the so-called dependence balance bound. In the lecture we will discuss the Schalkwijk coding schemes and the dependence balance bound. We will also consider connections to the multiple-access channel with feedback.

Biography

Frans Willems is a Full Professor in the Signal Processing Systems group. He is a researcher, teacher and supervisor in the field of information theory, with research contributions in the areas of multi-user information theory, noiseless source coding, data compression, data embedding, digital communication and biometrics.
Willems served as Associate Editor for Shannon Theory for the IEEE Transactions on Information Theory from 1988 to 1990 and as Associate Editor for Information Theory for the European Transactions on Telecommunications from 2002 to 2006. From 1998 to 2000, Willems was a member of the Board of Governors of the IEEE Information Theory Society; he became an IEEE Fellow in 2005. He was Counselor of the IEEE Student Branch Eindhoven from 2007-2014, and Chairman of the IEEE Benelux Chapter on Information Theory from 2007 to 2017.
Willems has contributed more than two hundred journal and conference papers. He holds several patents. He won the 2026 Shannon Award - the highest honor given by the IEEE Information Theory Society and is also regarded as the highest award in the entire field of information theory.

**** ALL ARE WELCOME ****

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