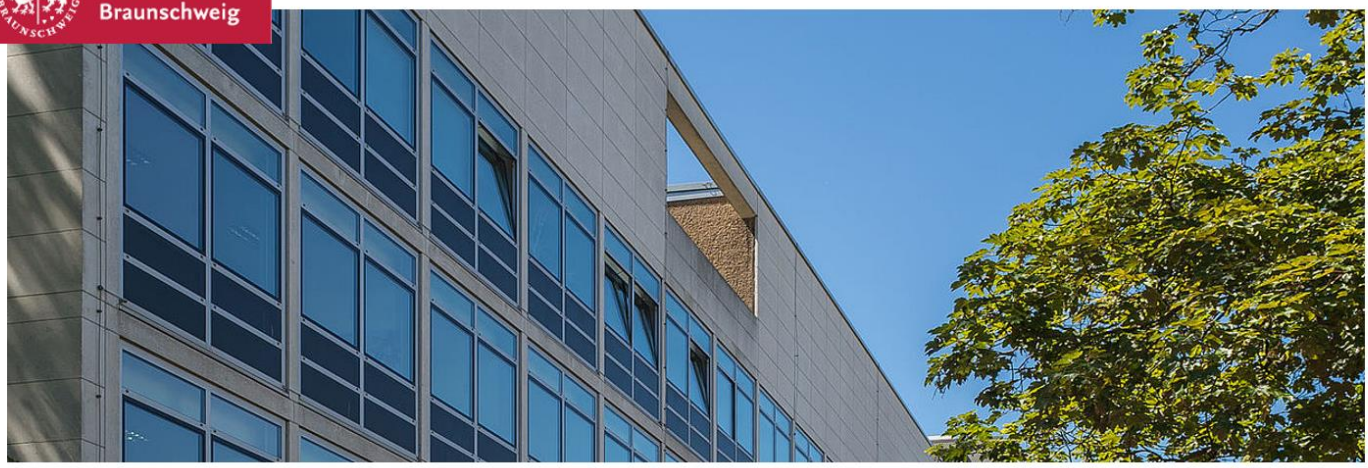
Technische Universität Braunschweig

Institut für Nachrichtentechnik



STUDENT ASSISTANT: Binary interference channel with no channel state information at the transmitter

Institute of Communications Technology
Supervisor: Ph.D. Pin-Hsun Lin
Starting asap

Description

Deriving capacities of memoryless multi-user (MU) channels usually relies on information-theoretic (IT) orders such as degraded, less noisy, or more capable, etc. When there is no instantaneous channel state information at the transmitter (CSIT), identifying whether an MU channel satisfies a certain IT order or not is usually not trivial. This makes deriving capacity results in this case much more involved than in cases with perfect CSIT. For example, when solely statistical CSIT is available, capacity is known only for very few cases such as the layered broadcast (BC), the binary fading interference channel (IC) under weak and strong interference, the one-sided layered IC, and the Gaussian wiretap channel (GWTC) under certain conditions. Our group has partly answered the following questions for fast fading Gaussian BC, Gaussian IC with strong and very strong interferences, and Gaussian WTC under statistical CSIT: When is it possible to reorder the realizations of random channel gains between different transmitter-receiver pairs to obtain an equivalent channel, such that the new channel gains satisfy a certain IT order within one codeword length? Besides, how to construct such equivalent channels? Finally, what are the capacity results?

Tasks

In this work, we aim to broaden our investigation of the aforementioned open problems. More specifically, recently, we have explicitly adopted the rate splitting from the Han-Kobayashi (HK) coding scheme with a non-uniform time sharing (TS), to analyze the achievable rate of a fast fading asymmetric B-IC with moderate interference with statistical CSIT, whose capacity region is still open. In this work, you will work closely with me on generalizing the scheme of HK coding with TS in the following 2 possible directions:

1. By inserting more degree of freedom on the HK code with respect to TS.
2. Considering a higher dimension of TS.

We will publish our results in international conferences and/or journal.

Requirements

- High interests on mathematical modelling and theoretical analysis
- Sufficient background knowledge of information theory

Notes

Where candidates have the same qualifications, preference will be given to disabled candidates (in that case, please attach proof of disability). Applications from international students are welcome. Please note that personal data will be stored for the application process.

Please send your application to lin@ifn.ing.tu-braunschweig.de.