

Explicit constructions of point sets and sequences with low discrepancy

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In this talk we discuss explicit constructions of sequences with optimal L_2 discrepancy and explicit constructions of point sets with optimal L_q discrepancy for $1 < q < \infty$. In 1954 Roth proved a lower bound for the L_2 discrepancy of finite point sets in the unit cube of arbitrary dimension. Later various authors extended Roth's result to lower bounds also for the L_q discrepancy and for infinite sequences. While it was known already from the early 1980s on that Roth's lower bound is best possible in the order of magnitude, it was a longstanding open question to find explicit constructions of point sets and sequences with optimal order of L_2 discrepancy. This problem was solved by Chen and Skriganov in 2002 for finite point sets and recently Dick and Pillichshammer gave an explicit construction for infinite sequences. These constructions can also be extended to give optimal order of the L_q discrepancy of finite point sets for $1 < q < \infty$.