Tractability properties of discrepancy

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Abstract

Discrepancies are quantitative measures for the irregularity of distribution of point sets in $[0;1]^d$ which are closely related to the error of quasi-Monte Carlo (QMC) integration rules. Classical results consider discrepancy with respect to its asymptotic dependence when the size N of a point set tends to infinity. In this sense optimal results are known, but often these results give no information on the pre-asymptotic scale, especially when the dimension d is large.

In 2001 Heinrich, Novak, Wasilkowski and Woźniakowski [1] initiated the study of the dependence of discrepancy on the dimension d with a remarkable result for the star discrepancy. They showed that for every N and d there exists a N-point set in $[0;1]^d$ with classical star discrepancy of at most $C\sqrt{d/N}$, where C is a positive constant independent of N and d. Since then a lot of papers on this topic with exciting results have appeared. Nevertheless, a lot of problems are still open.

In this talk we give a review of this topic and present some new results concerning the periodic L_2 discrepancy and the discrepancy with respect to the exponential Orlicz norm.

References

[1] S. Heinrich, E. Novak, G.W. Wasilkowski and H. Woźniakowski: *The inverse of the star-discrepancy depends linearly on the dimension*, *Acta Arith.*, 96:279-302, 2001.