Matousek

# Geometric Discrepancy

An Illustrated Guide

Discrepancy theory is also called the theory of irregularities of distribution. Here are some typical questions: What is the "most uniform" way of dis tributing n points in the unit square? How big is the "irregularity" necessarily present in any such distribution? For a precise formulation of these questions, we must quantify the irregularity of a given distribution, and discrepancy is a numerical parameter of a point set serving this purpose. Such questions were first tackled in the thirties, with a motivation com ing from number theory. A more or less satisfactory solution of the basic discrepancy problem in the plane was completed in the late sixties, and the analogous higher-dimensional problem is far from solved even today. In the meantime, discrepancy theory blossomed into a field of remarkable breadth and diversity. There are subfields closely connected to the original number theoretic roots of discrepancy theory, areas related to Ramsey theory and to hypergraphs, and also results supporting eminently practical methods and algorithms for numerical integration and similar tasks. The applications in clude financial calculations, computer graphics, and computational physics, just to name a few. This book is an introductory textbook on discrepancy theory. It should be accessible to early graduate students of mathematics or theoretical computer science. At the same time, about half of the book consists of material that up until now was only available in original research papers or in various surveys.

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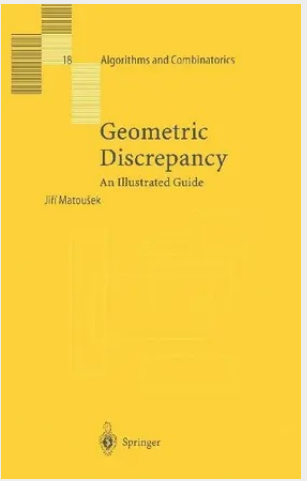


**160,49 €**
149,99 € (zzgl. MwSt.)

*Lieferfrist: bis zu 10 Tage*

**Artikelnummer:** 9783540655282
**Medium:** Buch
**ISBN:** 978-3-540-65528-2
**Verlag:** Springer
**Erscheinungstermin:** 19.05.1999
**Sprache(n):** Englisch
**Auflage:** 1. Auflage 1999
**Serie:** Algorithms and Combinatorics
**Produktform:** Gebunden
**Gewicht:** 1340 g
**Seiten:** 289
**Format (B x H):** 160 x 241 mm



**Kundenservice Verlag Dr. Otto Schmidt KG**
Neumannstraße 10, 40235 Düsseldorf | kundenservice@otto-schmidt.de | 0221-93738-997 (Inland)