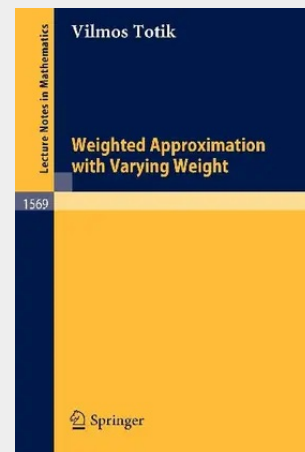


## Weighted Approximation with Varying Weight

A new construction is given for approximating a logarithmic potential by a discrete one. This yields a new approach to approximation with weighted polynomials of the form  $w^n P_n$  ("=" uppercase). The new technique settles several open problems, and it leads to a simple proof for the strong asymptotics on some  $L^p$  ("=" uppercase) extremal problems on the real line with exponential weights, which, for the case  $p=2$ , are equivalent to power-type asymptotics for the leading coefficients of the corresponding orthogonal polynomials. The method is also modified to yield (in a sense) uniformly good approximation on the whole support. This allows one to deduce strong asymptotics in some  $L^p$  ("=" uppercase) extremal problems with varying weights. Applications are given, relating to fast decreasing polynomials, asymptotic behavior of orthogonal polynomials and multipoint Padé approximation. The approach is potential-theoretic, but the text is self-contained.

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**26,70 €**

24,95 € (zzgl. MwSt.)

Lieferfrist: bis zu 10 Tage

**Artikelnummer:** 9783540577058

**Medium:** Buch

**ISBN:** 978-3-540-57705-8

**Verlag:** Springer

**Erscheinungstermin:** 28.02.1994

**Sprache(n):** Englisch

**Auflage:** 1. Auflage 1994

**Serie:** Lecture Notes in Mathematics

**Produktform:** Kartoniert

**Gewicht:** 201 g

**Seiten:** 118

**Format (B x H):** 155 x 235 mm

