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Asymptotics of Sobolev orthogonal polynomials for Hermite coherent pairs. (English)

Zbl 0990.42011

J. Comput. Appl. Math. 133, No. 1-2, 141-150 (2001).

A wide range of results regarding algebraic and analytic properties of polynomials (say, Q_n), orthogonal with respect to an inner product of the form

$$(f, g)_S = \int f g d\mu_0 + \int f' g' d\mu_1$$

is obtained under additional assumption that the measures μ_0 and μ_1 form a so-called coherent pair. If supported on the whole \mathbb{R} , either one of the measures μ_k from the coherent pair is $\exp(-x^2)dx$, and the corresponding sequence of monic Sobolev orthogonal polynomials form a one-parametric family, fully described by *H. G. Meijer* [J. Approximation Theory 89, No. 3, 321-343 (1997; Zbl 0880.42012)].

In this setting the authors prove several asymptotic results for Q_n (as $n \rightarrow \infty$). First, they establish the behavior of Q_n/H_n (where H_n are the Hermite polynomials) in $\mathbb{C} \setminus \mathbb{R}$. Further, they describe the behavior of this fraction with scaled variable, from where a Plancherel-Rotach asymptotics and the accumulation set of scaled zeros for Q_n follow.

Reviewer: **Andrei Martínez Finkelshtein** (Almeria)

MSC:

- 42C05** Orthogonal functions and polynomials, general theory of nontrigonometric harmonic analysis
- 33C45** Orthogonal polynomials and functions of hypergeometric type (Jacobi, Laguerre, Hermite, Askey scheme, etc.)

Cited in **7** Documents

Keywords:

Sobolev orthogonal polynomials; asymptotics; symmetrically coherent pairs; Hermite polynomials; Plancherel-Rotach asymptotics

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