Asymptotic behavior of varying discrete Sobolev orthogonal polynomials

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Discrete Sobolev (or Sobolev type) orthogonal polynomials have been widely studied in the literature (see, for example, the latest survey (cf. [1])). The contribution of this poster to this topic comes from the fact of considering a varying Sobolev inner product

$$(f,g)_S = \int f(x)g(x)d\mu + M_n f^{(j)}(c)g^{(j)}(c), \quad c \in \mathbb{R},$$

where $\mu$ is a positive measure supported on the real line and its support can be either bounded or unbounded, and $\{M_n\}_n$ is a sequence of nonnegative numbers satisfying a very general condition about its asymptotic behavior. Asymptotic properties of the orthogonal polynomials with respect to the above inner product have been given for particular cases of the measure $\mu$, for example see (cf. [2]) for Jacobi case. Now, strongly inspired by the techniques developed in (cf. [3]), we can obtain the Mehler–Heine type asymptotics which is a very relevant asymptotics for this type of discrete Sobolev orthogonal polynomials. As expected these Mehler–Heine formulae depend on the size of the sequence $\{M_n\}_n$. In addition, other asymptotic behaviors are provided.

References


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