On the Classical d-Orthogonal Polynomials Defined by Certain Generating Functions, II

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Abstract

This paper is a direct sequel to [5]. The present part deals with the problem of finding all d-orthogonal polynomial sets generated by $G(x,t) = e^t \Psi(xt)$. The resulting polynomials reduce to Laguerre polynomials for d=1 and to two-orthogonal polynomials associated with MacDonald functions for d=2, recently considered by the authors [6] and by Van Assche and Yakubovich [36]. Various properties for the obtained polynomials are singled out.

1   Introduction and preliminaries

During the two past decades, there has been increased interest in an extension of the notion of orthogonal polynomials known as multiple orthogonal polynomials (see, for instance, [3,10]). This notion, which is closely related to simultaneous Padé approximation, has many applications in various fields of mathematics as the number theory and the special functions theory. However, only recently examples of multiple orthogonal polynomials appeared in the literature. A convenient framework to discuss such examples consists of considering a subclass of multiple orthogonal polynomials known as d-orthogonal polynomials (see, for instance, [5,6,12-16, 27,36]). Our purpose in this work is to investigate some d-orthogonal polynomials defined by specified generating functions. The resulting polynomials are natural extensions of