Problems involving Special Functions

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Special functions commonly arise in many areas of modern engineering and physics applications. The importance of generalized functions of any kind stems from the fact that most special functions are simply special cases of them, and thus each recurrence formula developed for the generalized function becomes a master formula from which a large number of relations for other functions can be deduced. New relations for some of the special functions have been discovered in just this way. Also the use of generalized functions often facilitates the analysis by permitting complex expressions to be represented more simply in terms of same generalized function. Operations such as differentiation and integration can sometimes be performed more readily on the resulting generalized functions than on the original complex expression even though the two are equivalent.

Many special functions are introduced by the generating-function method.

Recently generating functions have been given for a number of generalizations of well-known set of orthogonal polynomials. Weisner has given a method of obtaining generating functions from the Lie group. With this theoretic method, we have derived a large number of generating functions for Laguerre and modified Laguerre polynomials [2], Jacobi and extended Jacobi polynomials [3–4].

We have also shown that many general families of bilinear, bilateral or mixed multilateral generating functions for the Laguerre (or modified Laguerre) and related polynomials [5] and for Jacobi and related Jacobi polynomials [6] can be derived from the corresponding known result for the classical cases.

In [1] we have studied certain modified moments related to the parabolic cylinder function and we have discussed a procedure for a numerical computation.

References

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