



Exploring Bivariate Gauss-Appell Polynomials: Theory and Application

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Abstract

This paper studies several characterizations of the bivariate Gauss-Appell polynomials, including explicit formulas, recurrence relations, determinant representations, and integral representations. In addition, the bivariate Gauss-Bernoulli, Gauss-Euler, and Gauss-Hermite polynomials are introduced and their corresponding properties are investigated. Surface plots are presented to illustrate the behavior of these polynomial families. Furthermore, an application involving approximation operators constructed by means of the bivariate Gauss-Appell polynomials is developed for approximating functions on a semi-infinite interval in a weighted function space. A numerical example is also included to demonstrate the convergence and efficiency of the proposed operators.