Ann Inst Stat Math (2011) 63:197–210
DOI 10.1007/s10463-008-0217-x

Bivariate Fibonacci polynomials of order k with statistical applications

Kiyoshi Inoue · Sigeo Aki

Received: 22 October 2007 / Revised: 11 June 2008 / Published online: 20 December 2008

Abstract In the present article, we investigate the properties of bivariate Fibonacci polynomials of order k in terms of the generating functions. For k and ℓ $(1 \leq \ell \leq k-1)$, the relationship between the bivariate Fibonacci polynomials of order k and the bivariate Fibonacci polynomials of order ℓ is elucidated. Lucas polynomials of order k are considered. We also reveal the relationship between Lucas polynomials of order k and Lucas polynomials of order ℓ. The present work extends several properties of Fibonacci and Lucas polynomials of order k, which will lead us a new type of geneses of these polynomials. We point out that Fibonacci and Lucas polynomials of order k are closely related to distributions of order k and show that the distributions possess properties analogous to the bivariate Fibonacci and Lucas polynomials of order k.

Keywords Fibonacci polynomials · Lucas polynomials · Success runs · Waiting time · Distributions of order k · Probability generating function · Continued fraction