Applications of infinite matrices in the theories of orthogonal polynomials and operational calculus

Luis Verde-Star
Universidad Autonoma Metropolitana, Mexico
verde@xanum.uam.mx

We use some algebras of infinite matrices $[a_{j,k}]$, where the indexes run over all the integers, to study sequences of polynomials and formal power series and also for the construction of a general operational calculus that can be used to solve linear functional equations of several types.
We consider infinite matrices of the form $\sum_k D_k X^k$, where the D_k are diagonal matrices, X is a shift, and $D_k \neq 0$ for only a finite number of negative values of k. Several basic properties and characterizations of orthogonal polynomial sequences are expressed in terms of infinite matrices.
This work extends some of the results obtained in our previous papers
L. Verde-Star, Characterization and construction of classical orthogonal polynomials using a matrix approach, Linear Algebra Appl. 438 (2013) 3635–3648.
G. Bengochea, L. Verde-Star, Linear algebraic foundations of the operational calculi, Adv. Appl. Math. 47 (2011) 330–351.