Operational rules for Brenke polynomial sets: Dunkl Appell $d$-orthogonal polynomials as special case

Hamza Chaggara$^1$  Gahami Abdelhamid$^2$

1. Department of Mathematics, I.P.E.I.M, Monastir University, Tunisia.
2. Department of Mathematics, E.S.S.T.H.S., Sousse University, Tunisia.

Abstract

For a given polynomial set $\{P_n\}_{n \geq 0}$, we define three operators, not depending on $n$, by

$$\lambda P_n = n P_{n-1}, \quad \rho P_n = P_{n+1} \quad \text{and} \quad \tau B_n = P_n, \quad n = 0, 1, \ldots, \quad (1)$$

where $P_{-1} = 0$ and $\{B_n\}_{n \geq 0}$ verifies

$$\lambda B_n = n B_{n-1}, \quad B_0(0) = 1 \quad \text{and} \quad B_n(0) = 0, \quad n = 1, 2, \ldots, \quad (2)$$

$\lambda$, $\rho$ and $\tau$ are called respectively the lowering, the raising and the transfer operators associated to the polynomial set $\{P_n\}_{n \geq 0}$ while $\{B_n\}_{n \geq 0}$ is called basic sequence associated to $\lambda$.

The operational rules associated to these two operators are known as quasi-monomiality principle.

In this work, we use quasi-monomiality technics to Brenke polynomial sets. In particular, we consider the Generalized Gould-Hopper polynomials, we give new proofs of some known corresponding properties as well as new expansions formula related to this family.

Key words. Quasi-monomiality; Brenke Polynomials; Generalized Gould-Hopper Polynomials.

References
