Operator Orderings: from sequences to polynomials

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Given two non-commutative operators p and q; it can be shown that any balanced word built from p and q can be expressed as a polynomial of the word $pq+qp$: In their 1988 paper[1], Bender and Dunne characterized the polynomials associated to some classical linear combinations - called orderings - of balanced words, such as the symmetric, Born-Jordan and Weyl ordering. They asked if this approach could be extended to any ordering, and if some properties of the corresponding polynomials could be exhibited. We will show the general solution to this problem, that involves several families of polynomials such as the continuous Hahn and the Pochhammer polynomials.

References

[1] C. M. Bender and G. V. Dunne, P