

BERNSTEIN-DURRMEYER TYPE OPERATORS ON HYPERCUBES

MIRELLA CAPPELLETTI MONTANO

Abstract

This talk is based on joint works with F. Altomare (cf. [1]) and V. Leonessa (cf. [1, 5]) and will focus on Bernstein-Durrmeyer type operators acting on spaces of continuous and integrable functions defined on the d -dimensional hypercube Q_d of \mathbf{R}^d , $d \geq 1$.

We investigate (cf. [1]) a class of operators that generalize the Bernstein-Durrmeyer operators with Jacobi weights on $[0, 1]$ (cf. [4, 6]). This class appears to be strictly connected with the study of certain degenerate second-order elliptic differential operators, often referred to as Fleming-Viot operators. By making mainly use of techniques arising from approximation theory, in fact, it is possible to show that the Fleming-Viot operators (pre)-generate positive semigroups both in the space of all continuous functions and in weighted L^p -spaces. In addition, those semigroups are approximated by iterates of the above mentioned Bernstein-Durrmeyer type operators. As a consequence, some regularity properties and the asymptotic behaviour of the semigroups can be inferred.

Inspired by [2, 3], we also present (cf. [5]) a further generalization of the operators in [1], by constructing Bernstein-Durrmeyer type operators defined by means of an arbitrary Borel measure μ on Q_d . Some approximation properties of this class of operators, both in the space of all continuous functions and in L^p -spaces with respect to μ , are discussed, together with an asymptotic formula.

Keywords: Bernstein-Durrmeyer operators, Jacobi weights, asymptotic formula, Fleming-Viot operator, Markov semigroup, Approximation of semigroups.

AMS Classification: 47D06, 47F05, 41A36, 41A63.

BIBLIOGRAPHY

- [1] **F. Altomare, M. Cappelletti Montano and V. Leonessa**, On the positive semigroups generated by Fleming-Viot type differential operators, *Comm. Pure Appl. Anal.* **18**(1) (2019), 323–340.

- [2] **E.E. Berdysheva**, Uniform convergence of Bernstein-Durrmeyer operators with respect to arbitrary measure, *J. Math. Anal. Appl.* **394** (2012), 324–336.
- [3] **E.E. Berdysheva, K. Jetter**, *Multivariate Bernstein Durrmeyer operators with arbitrary weight functions*, *J. Approx. Theory* **162** (2010), 576-598.
- [4] **H. Berens and Y. Xu**, On Bernstein-Durrmeyer polynomials with Jacobi weights, *in: C. K. Chui (Ed.), Approximation Theory and Functional Analysis, Academic Press, Boston, 1991, 25-46.*
- [5] **M. Cappelletti Montano and V. Leonessa**, A generalization of Bernstein-Durrmeier operators on hypercubes by means of an arbitrary measure, *Stud. Univers. Babeş-Bolyai Math.* **64**(2) (2019) 239–252.
- [6] **R. Paltanea**, Sur un opérateur polynomial défini sur l'ensemble des fonctions intégrables, *Univ. Babeş-Bolyai, Cluj-Napoca*, 83-2 (1983), 101-106.

Mirella Cappelletti Montano

Dipartimento di Matematica, Università degli Studi di Bari "Aldo Moro"

Campus Universitario, Via Edoardo Orabona n. 4

70125 Bari, ITALY

`mirella.cappellettimontano@uniba.it`