

A N I V E R S Ă R I

PROFESSOR DIMITRIE D. STANCU

AT HIS 65<sup>th</sup> BIRTHDAY

GH. COMAN\*

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Professor Dimitrie D. Stancu, a distinguished Romanian mathematician, was born on February 11, 1927 in Calacea-Timiş, Romania. After finishing secondary school in Arad, in 1947, he studied at the University of Cluj, from which he received a master's degree in 1951 and a doctor degree in mathematics in 1956. His advisor for the doctoral disertation was the famous mathematician Tiberiu Popoviciu (1906-1975), a great master of numerical analysis and approximation theory. After his graduation, in 1951, he was named assistant at the Department of Mathematics, University of Cluj, and -in a normal succesion- he advanced up to the rank of full professor in 1969. He holds a continuous academic career at this university, except for one academic year (1961-1962), when he was visiting at the University of Wisconsin, Madison, Wis., U.S.A.

During his teaching career, professor Stancu had given courses on numerical analysis, approximation theory, probability theory, mathematical analysis, arithmetic and theory of numbers

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and automatic computer programming.

Since 1961 he is a member of American Mathematical Society and a reviewer of Mathematical Reviews. He is also a member of the society Gesellschaft für Angewandte Mathematik und Mechanik and a reviewer of Zentralblatt für Mathematik. He is member of several editorial committees of mathematical journals: Calcolo (Italy), Revue d'Analyse Numérique et de Théorie de l'Approximation and Studia Univ. Babeş-Bolyai, Mathematica (Cluj-Napoca).

Professor D.D.Stancu has participated, presenting invited lectures, at several international symposiums and conferences on approximation theory, held in: Gatlinburg, Tennessee, U.S.A.(1963), Lancaster-England (1969), Varna-Bulgaria (1970), Durham-England (1977), Hamburg-Germany (1985 and 1990), Acquafredda di Maratea-Italy (1992). He also has presented contributed papers at several meetings of American Mathematical Society, held in New York, Chicago and Milwaukee (1961-1962) and at five international conferences organized by the Mathematical Research Institute of Oberwolfach-Germany, in the period 1971-1981. He has been invited to present colloquium talks at several universities from Germany (Stuttgart, Hannover, Göttingen, Dortmund, Münster, Siegen, Würzburg and Berlin), at two universities from Holland (Delft and Eindhoven) and at four universities from Italy (Roma, Napoli, Potenza and L'Aquila).

Professor D.D.Stancu exercised a profound influence on many of his students. He gave his own ideas generously to them. A number of 28 doctoral students were working under his guidance.

The outstanding attribute of D.D.Stancu is his devotion to research work. He has made important mathematical contributions in various areas of numerical analysis, approximation theory and probability theory. These fall into the following list of topics (the numbers in the square brackets refer to the items from the list of selected mathematical papers of D.D.Stancu, annexed to this article):

1) **Interpolation theory:** interpolation with multiple nodes [6], [34]; multivariate interpolation [2], [3], [4], [8], [31], [54], [55]; study and use of divided differences [24], [32], [58], [60].

2) **Numerical differentiation:** extension to several variables of the Steffensen theorem on remainders [1], representations of remainders in numerical partial differentiation procedures [25], [32].

3) **Orthogonal polynomials:** a class of symmetric orthogonal polynomials on  $(-a, a)$  for a weight function of the form  $w(x) = p(x)x^{2s}$  [9]; orthogonal polynomials obtained by some general Christoffel type formulas [7], [10], [13], [17], [64]; power orthogonal polynomials [80], [82].

4) **Numerical quadratures and cubatures:** formulas of high degree o exactness [10], [12], [24], [59], [64]; Gauss-Christoffel quadrature formulas [7], [10], [17], [77]; quadrature formulas obtained by linear positive operators [66], [67], [79]; cubature formulas [3], [5], [11], [13].

5) **Taylor-type expansions:** use of multivariate interpolation for obtaining Taylor-type formulas for several variables [15],

[20], [32]; integral representations for remainders in multivariate Taylor expansions [20], [26], [32].

6) **Approximation by linear positive operators:** operators of Bernstein type [16], [21], [22], [27], [38], [39], [42], [50], [68], [70], [81]; representation of remainders [28], [32], [51], [54], [61], [63], [68], [74]; construction by interpolation methods [27], [52], [55], [56]; multivariate approximation by means of linear positive operators [16], [21], [22], [27], [28], [29], [43], [46], [47], [49], [55], [57], [72], [75]; Bernstein power series [48], [52], [53], [54]; monotonicity of the derivatives of the sequences of Bernstein polynomials [36], [60].

7) **Representations of remainders in linear approximation formulas in several variables:** representations by divided differences [2], [4], [28], [32], [57]; integral representations of remainders [15], [20], [25], [26], [32].

8) **Probabilistic methods in the theory of uniform approximation of continuous functions:** construction by probabilistic methods of linear positive operators [21], [41], [47], [68], [73].

9) **Use of interpolation and calculus of finite differences in probability theory:** integral representations of the distribution functions of some multivariate discrete distributions [44]; expressions in terms of finite differences for different types of moments of random discrete variables [31], [40], [41], [45], [47], [69].

10) **Spline approximation:** approximation of functions by Schoenberg type spline operators [52], [65].

Ending this article we join the members of the family of mathematicians of Professor D.D.Stancu, his colleagues and students, as well of many friends from Romania and many other countries, congratulating him with esteem on his 65<sup>th</sup> anniversary, wishing him good health and happiness. May he be granted with many more years with an active life and with new satisfactions in his scientific research work.

A LIST OF SELECTED MATHEMATICAL PAPERS OF  
PROFESSOR D.D.STANCU

1. Contributions to the partial numerical differentiation of functions of two and several variables. Acad. R.P.Române, Bul. Sti. Sect. Sti. Mat. Fiz. 8(1956), 733-763 (Romanian. Russian and French summaries). MR 20, No. 1873.
2. A study of the polynomial interpolation of functions of several variables, with applications to the numerical differentiation and integration; methods for evaluating the remainders. Doctoral Dissertation, University of Cluj, 1956 (Romanian), 192 pages.
3. Generalization of some interpolation formulas for functions of several variables and certain considerations on the numerical integration formula of Gauss. Acad. R.P.Române, Bul. St. Sect. Mat. Fiz. 9(1957), 287-313 (Romanian. Russian and French summaries). MR 20, No. 1874.

4. Consideration on the polynomial interpolation of functions of several variables. Bul. Univ. V.Babeş and Bolyai, Cluj, 1(1957), 43-82 (Romanian. Russian and French summaries).
5. Contributions to the numerical integration of functions of several variables. Acad. R.P.Române, Fil. Cluj, Stud. Cerc. Mat. (Cluj), 8(1957), 75-101 (Romanian. Russian and French summaries). MR 21, No. 6092.
6. On the Hermite interpolation formula and on some of its applications. Acad. R.P.Române, Fil. Cluj, Stud. Cerc. Mat. (Cluj), 8(1957), 339-355 (Romanian. Russian and French summaries). MR 21, No. 6093.
7. A generalization of the Gauss-Christoffel quadrature formula. Acad. R.P.Române, Fil. Iaşi, Stud. Cerc. Mat. 8(1957), no. 1, 1-18 (Romanian. Russian and French summaries). MR 20, No. 1875.
8. Generalizations of certain interpolation formulae for the functions of several variables. Bull. Inst. Politehn. Iaşi (N.S), 3(7) (1957), no. 1-2, 31-38 (Romanian. Russian and English summaries). MR 20, No. 2558.
9. Sur une classe de polynômes orthogonaux et sur des formules générales de quadrature à nombre minimum de termes. Bull. Math. Soc. Sci. Math. Phys. R.P.Romaine (N.S) 1(49) (1957), 479-498. MR 21, No. 3700.
10. A method for constructing quadrature formulas of high degree of exactness. Comunic. Acad. R.P.Române 8(1958), no. 4, 349-358. MR 21, No. 1475.
11. On some general numerical integration formulas. Acad.

- R.P.Române, Stud. Cerc. Mat. 9(1958), 209-216 (Romanian. Russian and French summaries). MR 20, No. 4917.
12. On the Gaussian quadrature formulas. Studia Univ. V.Babeş and Bolyai, Cluj, 1(1958), 71-84 (Romanian. Russian and French summaries).
13. A method for constructing cubature formulas for functions of two variables. Acad. R.P.Române, Fil. Cluj, Stud. Cerc. Mat. (Cluj) 9(1958), 351-369 (Romanian. Russian and French summaries). MR 21, No. 6094.
14. On numerical integration of functions of two variables. Acad. R.P.Române, Fil. Iaşi, Stud. Cerc. Sti. Mat. (Iaşi) 9(1958), no. 1, 5-21 (Romanian. Russian and French summaries). MR 21, No. 1474.
15. On some Taylor expansions for functions of many variables. Rev. Math. Pures Appl., Acad. R.P.Române 4(1959), no. 2, 249-265 (Russian). MR 22, No. 3909.
16. On the approximation by Bernstein type polynomials of functions of two variables. Comunic. Acad. R.P.Române 9(1959), no. 8, 773-777 (Romanian. Russian and French summaries). MR 22, No. 4908.
17. Sur quelques formules générales de quadrature du type Gauss-Christofel. Mathematica (Cluj) 1(24) (1959), no. 1, 167-182. MR 22, No. 11078.
18. On a proof of the Weierstrass theorem. Bul. Inst. Politehn. Iaşi (N.S) 5(9) (1959), no. 1-2, 47-50 (Romanian. Russian and Italian summaries). MR 23, No. A455.
19. On the approximation of functions of two variables by

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20. The integral expression of the remainder in a formula of Taylor type for functions of two variables. Acad. R.P.Române, Fil. Cluj, Stud. Cerc. Mat. (Cluj) 11(1960), no. 1, 177-183 (Romanian. Russian and French summaries). MR 24, No. A196.
21. On some Bernstein type polynomials. Acad. R.P.Române, Fil. Iași, Stud. Cerc. Mat. (Iași) 11(1960), no. 2, 221-233 (Romanian. Russian and French summaries). MR 24, No. A374a.
22. Some Bernstein polynomials in two variables and their applications. Soviet. Math. Dokl. 1(1960), 1025-1028. MR 23A, No. A3401.
23. Sur l'approximation des dérivées des fonctions par les dérivées correspondantes de certaines polynomes du type Bernstein. Mathematica (Cluj) 2(25) (1960), no.2, 335-348. MR 24, No. A376.
24. On the calculation of the coefficients of a general quadrature formula. Studia Univ. Babeș-Bolyai, Cluj, Ser. Math.-Phys. 5(1960), no. 1, 187-192. (Romanian. Russian and French summaries). MR 27, No. 6389.
25. The expression of the remainder in some numerical partial differentiation formulas. Acad. R.P.Române, Fil. Cluj, Stud. Cerc. Mat. (Cluj), 11(1960), no. 2, 371-380 (Romanian. Russian and French summaries). MR 27, No. 6388.

26. On the integral representation of the remainder from the Taylor formula in two variables. Acad. R.P.Române, Fil. Cluj, Stud. Cerc. Mat. (Cluj) **13**(1962), no. 1, 175-182 (Romanian. Russian and French summaries). MR **27**, No. 5880.
27. A method for obtaining polynomials of Bernstein type of two variables. Amer. Math. Monthly **70**(1963), no. 3, 260-264 MR **27**, No. 2762.
28. Evaluation of the remainder term in approximation formulas by Bernstein polynomials. Math. Comp. **17**(1963), 83, 270-278. MR **31**, No. 3772.
29. Generalization of an inequality of G.G.Lorentz. Anal. Sti. Univ. Al.I.Cuza, Iași **9**(1963), no. 1, 49-58. MR **32**, No. 2803.
30. Quadrature formulas with simple Gaussian nodes and multiple fixed nodes (in collaboration with A.H.Stroud). Math. Comp. **17**(1963), no. 84, 384-394. MR **28**, No. 718.
31. On the moments of certain discrete random variables. Studia Univ. Babeş-Bolyai, Cluj, **9**(1964), no. 2, 35-48 (Romanian. Russian and French summaries). MR **31**, No. 782.
32. The remainder of certain linear approximation formulas in two variables. J.SIAM, Numer. Anal. **1**(1964), 137-163. MR **31**, No. 1503.
33. Quadrature formulas with multiple Gaussian nodes (in collaboration with A.H.Stroud). J.SIAM, Numer. Anal. **2**(1965), 129-143. MR **31**, No. 4177.
34. On Hermite's osculatory interpolation formula and on some generalizations of it. Mathematica (Cluj) **8**(31) (1966), no.

- 2, 373-391. MR 35, No. 2030.
35. A method for computing the moments of the multinomial and multiple Poisson distributions. *Studia Univ. Babeş-Bolyai, Cluj*, 12(1967), no. 1, 49-54. MR 35, No. 7375.
36. On the monotonicity of the sequence formed by the first order derivatives of the Bernstein polynomials. *Mathem. Zeitschr.* 98(1967), 46-51. MR 35, No. 3018.
37. On the moments of negative order of the positive Bernoulli and Poisson variables. *Studia Univ. Babeş-Bolyai, Cluj*, 13(1968), no. 1, 27-31. MR 37, No. 2352.
38. Approximation of functions by a new class of linear polynomial operators. *Rev. Roumaine Math. Pures Appl.* 13(1968), no. 8, 1173-1194. MR 38, No. 6278.
39. On a new positive linear polynomial operator. *Proc. Japan Acad.* 44(1968), 221-224. MR 38, No. 461.
40. On the Markov probability distribution. *Bull. Math. Soc. Sci. Math. R.S.Roumanie* 12(1968), no. 4, 203-208. MR 40, No. 8107.
41. Use of probabilistic methods in the theory of uniform approximation of continuous functions. *Rev. Roumaine Math. Pures Appl.* 14(1969), no. 5, 673-691. MR 40, No. 606.
42. On a generalization of the Bernstein polynomials. *Studia Univ. Babeş-Bolyai, Cluj, Ser. Math.-Phys.* 14(1969), 31-45 (Romanian. Russian and English summaries). MR 43, No. 775.
43. Approximation of functions of two and several variables by a class of polynomials of Bernstein type. *Stud. Cerc. Mat., Bucharest*, 22(1970), no. 2, 335-345. (Romanian. English

- summary). MR 47, No. 2242.
44. On the distribution functions of the multidimensional Bernoulli and Poisson laws. Stud. Cerc. Mat., Bucharest, 22(1970), no. 4, 675-681 (Romanian. English summary). MR 47, No. 7848.
  45. Recurrence relations for the central moments of some discrete probability laws. Studia Univ. Babeş-Bolyai, Cluj, Ser. Math.-Mech. 15(1970), 55-62 (Romanian. Russian and English summaries). MR 41, No. 9368.
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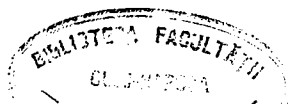
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51. On the remainder of approximation of functions by means of a parameter-dependent linear polynomial operator. *Studia Univ. Babeş-Bolyai, Cluj, Ser. Math.-Mech.* **16**(1971), no.2, 59-66. MR **46**, No. 4072.
52. Approximation of functions by means of some new classes of positive linear operators. In: *Numerische Methoden der Approximationstheorie, Bd. I* (Proc. Conf. Math. Res. Inst. Oberwolfach, 1971; eds. L.Collatz, G.Meinardus), 187-203. Basel: Birkhäuser, 1972. MR **52**, No. 1107.
53. A new generalization of the Meyer-König and Zeller operators. *Anal. Univ. Timişoara, Ser. Sti. Mat.* **10**(1972), no. 2, 207-214. MR **49**, NO. 11113.
54. Evaluation of the remainders in certain approximation procedures by Meyer-König and Zeller type operators. In: *Numerische Methoden der Approximationstheorie, II* (Proc. Conf. Math. Res. Inst. Oberwolfach, 1973; eds. L.Collatz, G.Meinardus; ISNM 26), Basel-Stuttgart, 1975, 139-150. MR **52**, No. 9568.
55. Use of Biermann's interpolation formula for constructing a class of positive linear operators for approximating multivariate functions. In: *Constructive Theory of Functions of Several Variables* (Proc. Conf. Math. Res. Inst. Oberwofach, 1976; eds. W.Schempp, K.Zeller), 267-276. Berlin: Springer, 1977. MR **58**, No. 1915.

56. Use of linear interpolation for constructing a class of Bernstein polynomials. Stud. Cerc. Mat. (Bucharest) 28(1976), 369-379 (Romanian. English summary). MR 54, No. 3226.
57. Approximation of bivariate functions by means of some Bernstein-type operators. In: Multivariate Approximation (Proc. Sympos. Durham, 1977; ed. D.C.Handscomb), 189-208, London, New York, San Francisco: Acad. Press, 1978. MR 80f, No. 41015.
58. On the precision of approximation of differentiable functions by means of linear positive operators. Itinerant Seminar on functional equations, approximation and convexity, Univ. Babeş-Bolyai, Cluj-Napoca, 1978, 74-75 (Romanian)
59. An extremal problem in the theory of numerical quadratures with multiple nodes. In: Proc. Third Colloquium on Operation Research (Cluj-Napoca, 1978), 257-262, Univ. Babeş-Bolyai, 1979. MR 83c, No. 65044.
60. Application of divided differences to the study of monotonicity of the derivatives of the sequence of Bernstein polynomials. Calcolo 16(1979), 431-445. MR 82b, No. 41008.
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62. Representations of the remainder in some linear approximation formulas. Itinerant Seminar on functional

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71. A note on a multiparameter Bernstein-type approximating operator. *Mathematica (Cluj)*, 26(49) (1984), no. 2, 153-157. MR 86m, No. 41019.
72. Bivariate approximation by some Bernstein-type operators. *Proc. Colloquium on Approximation and Optimization*, Univ. Cluj-Napoca, 1984, 25-34. MR 87j, No. 41028.
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77. Quadrature formulae of high degree of exactness using multiple preassigned nodes. Contract, Institutul Central de Matematică, București, 1989, 25 pag.
78. On quadratures generated by linear positive operators. Colloquium on Applications of Mathematics, on the occasion of the 80<sup>th</sup> birthday of Lothar Collatz. Abstracts of lectures, Hamburg, July 1990, p. 94.
79. Quadrature rules obtained by means of interpolatory linear positive operators. Rev. Anal. Numér. Théor. Approx. 21(1992), no. 1, 75-81.
80. Mean-value formulae for integrals obtained by using Gaussian type quadratures (in collab. with M.R.Occorsio), Rend. Circ. Mat. Palermo 42(1993), no.1.
81. Approximation properties of a general Bernstein-type operator. Proc. Internat. Conf. Functional Analysis and Approximation Theory, Acquafredda di Maratea, Italy, 14-19 Sept. 1992 (to appear).
82. Extensions to power-orthogonal polynomials of a mean-value formula of N.Cioranescu (in collab. with L.Gori Nicolò-Amati), to appear in Studia Univ. Babeș-Bolyai, Cluj-Napoca, Ser. Math., 38(1993).



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