

ITERATES OF BERNSTEIN TYPE OPERATORS ON A SQUARE WITH ONE CURVED SIDE VIA CONTRACTION PRINCIPLE

TEODORA CĂȚINAȘ* AND DIANA OTROCOL**

*Babeș-Bolyai University, Faculty of Mathematics and Computer Science
Str. M. Kogălniceanu Nr. 1, RO-400084 Cluj-Napoca, Romania
E-mail: tcatinas@math.ubbcluj.ro

**Tiberiu Popoviciu Institute of Numerical Analysis of Romanian Academy
Cluj-Napoca, Romania
E-mail: dotrocol@ictp.acad.ro

Abstract. Given a function defined on a square with one curved side, we consider some Bernstein-type operators as well as their product and Boolean sum. Using the weakly Picard operators technique and the contraction principle, we study the convergence of the iterates of these operators.

Key Words and Phrases: Square with curved side, Bernstein operators, contraction principle, weakly Picard operators.

2010 Mathematics Subject Classification: 41A36, 41A25, 39B12, 47H10.

Acknowledgement. The authors are grateful to professor I.A. Rus for his helpful comments and suggestions.

REFERENCES

- [1] O. Agratini, I.A. Rus, *Iterates of a class of discrete linear operators via contraction principle*, Comment. Math. Univ. Caroline, **44**(2003), 555-563.
- [2] O. Agratini, I.A. Rus, *Iterates of some bivariate approximation process via weakly Picard operators*, Nonlinear Analysis Forum, **8**(2003), no. 2, 159-168.
- [3] P. Blaga, T. Căținaș, G. Coman, *Bernstein-type operators on triangle with one curved side*, Mediterr. J. Math., **10**(2013), 10.1007/s00009-011-0156-2, in press.
- [4] P. Blaga, T. Căținaș, G. Coman, *Bernstein-type operators on a square with one and two curved sides*, Studia Univ. Babeș-Bolyai Math., **55**(2010), no. 3, 51-67.
- [5] P. Blaga, T. Căținaș, G. Coman, *Bernstein-type operators on triangle with all curved sides*, Appl. Math. Comput., **218**(2011), 3072-3082.
- [6] G. Coman, T. Căținaș, *Interpolation operators on a triangle with one curved side*, BIT Numerical Mathematics, **50**(2010), no. 2, 243-267.
- [7] I. Gavrea, M. Ivan, *The iterates of positive linear operators preserving the affine functions*, J. Math. Anal. Appl., **372**(2010), 366-368.
- [8] I. Gavrea, M. Ivan, *The iterates of positive linear operators preserving the constants*, Appl. Math. Lett., **24**(2011), no. 12, 2068-2071.
- [9] I. Gavrea, M. Ivan, *On the iterates of positive linear operators*, J. Approximation Theory, **163**(2011), no. 9, 1076-1079.
- [10] H. Gonska, D. Kacsó, P. Pițul, *The degree of convergence of over-iterated positive linear operators*, J. Appl. Funct. Anal., **1**(2006), 403-423.

- [11] H. Gonska, P. Pițul, I. Rașa *Over-iterates of Bernstein-Stancu operators*, *Calcolo*, **44**(2007), 117-125.
- [12] H. Gonska, I. Rașa *The limiting semigroup of the Bernstein iterates: degree of convergence*, *Acta Math. Hungar.*, **111**(2006), no. 1-2, 119-130.
- [13] S. Karlin, Z. Ziegler, *Iteration of positive approximation operators*, *J. Approximation Theory* **3**(1970), 310-339.
- [14] R.P. Kelisky, T.J. Rivlin, *Iterates of Bernstein polynomials*, *Pacific J. Math.*, **21**(1967), 511-520.
- [15] I.A. Rus, *Generalized Contractions and Applications*, Cluj Univ. Press, 2001.
- [16] I.A. Rus, *Iterates of Stancu operators, via contraction principle*, *Studia Univ. Babeș-Bolyai Math.*, **47**(2002), no. 4, 101-104.
- [17] I.A. Rus, *Iterates of Bernstein operators, via contraction principle*, *J. Math. Anal. Appl.*, **292**(2004), 259-261.
- [18] I.A. Rus, *Fixed point and interpolation point set of a positive linear operator on $C(\overline{D})$* , *Studia Univ. Babeș-Bolyai Math.*, **55**(2010), no. 4, 243-248.

Received: December 7, 2011; Accepted: January 10, 2012.

