

CERTAIN SUBORDINATION RESULTS INVOLVING A CLASS OF OPERATORS

POONAM SHARMA¹, RAVINDER KRISHNA RAINA², JANUSZ SOKÓŁ³

ABSTRACT. This paper, by applying some known results in the theory of differential subordination, obtains certain new subordination properties involving a class of operators denoted by $\mathfrak{S}_{\lambda, \mu}^m(a, c, A)$ in the open unit disk. The class of operators used is a composition structure of simple forms of differential and integral operators with the Erdélyi-Kober integral operator. Several results for this operator and also involving simpler operators $\mathfrak{S}_{\lambda, \mu}^m$ and $\tilde{I}_A^{a, c}$ are mentioned and relevances with some known results are also indicated.

REFERENCES

- [1] F. M. Al-Oboudi, *On univalent functions defined by a generalized Salagean operator*, Int. J. Math. Math. Sci., **27** (2004), 1429–1436.
- [2] A. Cătaş, *On a certain differential sandwich theorem associated with a new generalized derivative operator*, Gen. Math., **17** (4), (2009), 83–95.
- [3] P. Eenigenburg, S. S. Miller, P. T. Mocanu and M. O. Reade, *On a Briot-Bouquet differential subordination*, in General Inequalities 3, pp. 339–348, International Series of Numerical Mathematics, Vol. 64, Birkhäuser Verlag, Basel, 1983; see also Rev. Roumaine Math. Pures Appl., **29** (1984), 567–573.
- [4] Chun-Yi Gao, Shao-Mou Yuan and H. M. Srivastava, *Some functional inequalities and inclusion relationships associated with certain families of integral operators*, Comput. Math. Appl., **49** (2005), 1787–1795.
- [5] D. I. Hallenbeck and St. Ruscheweyh, *Subordination by convex functions*, Proc. Amer. Math. Soc., **52** (1975), 191–195.
- [6] I. B. Jung, Y. C. Kim and H. M. Srivastava, *The Hardy space of analytic functions associated with certain one-parameter families of integral operators*, J. Math. Anal. Appl., **176** (1993), 138–147.
- [7] V. Kiryakova, *Generalized Fractional Calculus and Applications*, Pitman Research Notes in Mathematics Series, 301, John Wiley & Sons, Inc. New York, 1994.
- [8] Y. Komatu, *On analytical prolongation of a family of operators*, Math. (Cluj), **32** (55), (1990), 141–145.
- [9] S. S. Miller and P. T. Mocanu, *Differential Subordinations. Theory and Applications*. Marcel Dekker Inc., New York, Basel, 2000.
- [10] R. K. Raina and P. Sharma, *Subordination properties of univalent functions involving a new class of operators*, Electronic Journal of Mathematical Analysis and Applications, **2** (1), (2014), 37–52.
- [11] G. S. Sălăgean, *Subclasses of univalent functions*, in *Complex Analysis: Fifth Romanian-Finnish Seminar, Part I* (Bucharest, 1981), Lecture Notes in Mathematics 1013, Springer-Verlag, Berlin and New York 1983.
- [12] C. Selvaraj and K. R. Karthikeyan, *Differential subordination and superordination for analytic functions defined using a family of generalized differential operators*, An. St. Univ. Ovidius Constanta, **17** (1), (2009), 201–210.
- [13] H. M. Srivastava and A. Y. Lashin, *Some Applications of the Briot-Bouquet differential subordination*, J. Inequal. Pure Appl. Math., **6** (2) 41, (2005).

Received 8 October 2013

2000 *Mathematics Subject Classification*. Primary 30C45; Secondary 30C80.

Key words and phrases. Differential subordination, convex function, univalent functions, differential and integral operators, Erdélyi-Kober integral operator, linear operator.

¹ DEPARTMENT OF MATHEMATICS & ASTRONOMY, UNIVERSITY OF LUCKNOW, LUCKNOW 226007 INDIA

² M.P. UNIVERSITY OF AGRI. AND TECHNOLOGY, UDAIPUR, RAJASTHAN, INDIA, *Present address:* 10/11 GANPATI VIHAR, OPPOSITE SECTOR 5, UDAIPUR 313002, INDIA

³ DEPARTMENT OF MATHEMATICS, RZESZÓW UNIVERSITY OF TECHNOLOGY, AL. POWSTAŃCÓW WARSZAWY 12, 35-959 RZESZÓW, POLAND

E-mail address: ¹ sharma_poonam@lkouniv.ac.in, ² rkraina.7@hotmail.com, ³ jsokol@prz.edu.pl