Differential subordinations for non-analytic functions

Georgia Irina Oros and Gheorghe Oros

Department of Mathematics and Computer Science, University of Oradea, Romania

georgia_oros_ro@yahoo.co.uk

In paper [4], Petru T. Mocanu has obtained sufficient conditions for a function in the class $C^1(U)$, respectively $C^2(U)$ to be univalent and to map U onto a domain which is starlike (with respect to origin), respectively convex. Those conditions are similar to those in the analytic case. In paper [5], Petru T. Mocanu has obtained sufficient conditions of univalency for complex functions in the class C^1 which are also similar to those in the analytic case. Having those papers as inspiration, we try to introduce the notion of subordination for non-analytic functions of classes C^1 and C^2 following the classical theory of differential subordination for analytic functions introduced by S.S. Miller and P.T. Mocanu in papers [1] and [2] and developed in the book [3].

Let Ω and Δ be any sets in the complex plane $\mathbb{C}$, let p be a non-analytic function in the unit disc U, let p be a function in the class $C^2(U)$ and let $\psi(r;s;t;z):\mathbb{C}^3\times U\to\mathbb{C}$. In this article we consider the problem of determining properties of the function p, non-analytic in the unit disc U, such that p satisfies the differential subordination

$$\left\{\psi\left(p(z);izDp(z);iz^2D'p(z);z\right)\right\}\subset\Omega\ \Rightarrow\ p(U)\subset\Delta.$$

References

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