Differential subordinations for non-analytic functions

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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 $\Omega$ and $\Delta$ be any sets in the complex plane $\mathbb{C}$, let $p$ be a non-analytic function in the unit disc $U$, let $\psi$ be a function in the class $C^2(U)$ and let $\psi(r;s;t;z) : C^3 \times U \rightarrow \mathbb{C}$. 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

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

References


