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Non-autonomous Differential Subordinations Related to a Sector

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Abstract:

Let $\lambda(z)$ be a complex valued function defined in the unit disc E and let $p(z)$ be a function analytic in E with $p(0)=1$ and $p(z)\neq 0$ in E. In this article, we determine the largest constants $\gamma_k, k=1,2,3,\ldots$ and conditions on $\lambda(z)$ such that for given α,β and δ, the non-autonomous differential subordination

$$(p(z))^{\beta}\left[1+\lambda(z)\frac{zp'(z)}{p^k(z)}\right]^{\alpha}\prec\left(\frac{1+z}{1-z}\right)^{\gamma_k},\ z\in E,$$

implies

$$p(z)\prec\left(\frac{1+z}{1-z}\right)^{\delta}$$

in E. Here the symbol ` $\prec$ ' stands for subordination. Almost all the previously known results on differential subordination concerning a sector follow as particular cases of our results.

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