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Generalized Integral Operator and Multivalent Functions

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Abstract:

Let $\mathcal{A}(p)$ be the class of functions $f : f(z) = z^p + \sum_{j=1}^{\infty} a_j z^{p+j}$ analytic in the open unit disc E. Let, for any integer $n > -p$, $f_{n+p-1}(z) = \frac{z^p}{(1-z)^{n+p}}$. We define $f_{n+p-1}^{(-1)}(z)$ by using convolution $\star$ as $f_{n+p-1}(z) \star f_{n+p-1}^{(-1)}(z) = \frac{z^p}{(1-z)^{n+p}}$. A function p, analytic in E with $p(0) = 1$, is in the class $P_k(\rho)$ if $\int_0^{2\pi} \left| \frac{Re p(z) - \rho}{p - \rho} \right| d\theta \le k\pi$, where $z = re^{i\theta}, k \ge 2$ and $0 \le \rho < p$. We use the class $P_k(\rho)$ to introduce a new class of multivalent analytic functions and define an integral operator $I_{n+p-1}(f) = f_{n+p-1}^{(-1)} \star f(z)$ for $f(z)$ belonging to this class. We derive some interesting properties of this generalized integral operator which include inclusion results and radius problems.