NEW CRITERIA FOR MULTIVALENTLY
MEROMORPHIC CONVEX FUNCTIONS OF ORDER α

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Abstract. Let $\mathscr{J}_{n+p-1}(\alpha)$ $(p \in \mathbb{N}, n > -p, 0 \leqslant \alpha < p)$ denote the class of functions of the form

$$f(z) = \frac{1}{z^p} + \frac{a_0}{z^{p-1}} + \frac{a_1}{z^{p-2}} + \cdots$$

which are regular and p-valent in the punctured unit disc

$$\mathbb{U}^* = \{z \in \mathbb{C} : 0 < |z| < 1\}$$

and satisfy the condition

$$\mathrm{Re}\left\{ \frac{(D^{n+p}f(z))'}{(D^{n+p-1}f(z))'} - (p+1) \right\} < -\frac{p(n+p-1)+\alpha}{n+p},$$

where

$$D^{n+p-1}f(z) = \frac{1}{z^p(1-z)^{n+p}} * f(z).$$

It is proved that $\mathscr{J}_{n+p}(\alpha) \subset \mathscr{J}_{n+p-1}(\alpha)$. Since $\mathscr{J}_0(\alpha)$ is the class of p-valently meromorphic convex functions of order α $(0 \leqslant \alpha < p)$, all functions in $\mathscr{J}_{n+p-1}(\alpha)$ are p-valently meromorphic convex of order α. Further, we consider the integral operators of functions in $\mathscr{J}_{n+p-1}(\alpha)$.

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REFERENCES

[1] M. K. Aouf and H. M. Srivastava, *A new criterion for meromorphically p-valent convex functions of order alpha*, Math. Sci. Res. Hot-Line **1**, 8 (1997), 7–12.

[2] S. K. Bajpai, *A note on a class of meromorphic univalent functions*, Rev. Roumaine Math. Pures Appl. **22**, 3 (1977), 295–297.

[3] H. E. Darwish, M. K. Aouf and G. S. Sălăgean, *A new criterion for meromorphically convex functions of order α*, Gen. Math. **13**, 3 (2005), 71–80.

[4] R. M. Goel and N. S. Sohi, *On a class of meromorphic functions*, Glas. Mat. Ser. III **17** (37), 1 (1982), 19–28.

[5] I. S. Jack, *Functions starlike and convex of order α*, J. London Math. Soc. (2) **3** (1971), 469–474.

[6] S. S. Miller and P. T. Mocanu, *Differential subordinations. Theory and applications*, vol. 225. of Monographs and Textbooks in Pure and Applied Mathematics, Marcel Dekker, New York, NY, USA, 2000.

[7] B. A. Uralegaddi and M. D. Ganigi, *A new criterion for meromorphic convex functions*, Tamkang J. Math. **19**, 1 (1988), 43–48.

[8] B. A. Uralegaddi and H. S. Patil, *A new criterion for p-valent meromorphic convex functions*, Math. Chronicle **18** (1989), 75–77.

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