Regularity and fast escaping points of entire functions

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We give a new sufficient condition for a point to be in the fast escaping set $A(f)$ of a transcendental entire function f; see [2] for details and results about $A(f)$. More precisely, we show that the 'quite fast escaping set' $Q(f)$, introduced in [3], is equal to $A(f)$ if and only if the maximum modulus of f satisfies a certain regularity condition called 'weak regularity'. We show that weak regularity holds, as does an even stronger regularity condition called 'log-regularity', whenever the minimum modulus of f is not too large, in particular whenever f belongs to the Eremenko-Lyubich class $\mathcal{B}$; see [1].

References

[1] A.E. Eremenko and M.Yu. Lyubich, Dynamical properties of some classes of entire functions, *Ann. Inst. Fourier, Grenoble*, 42 (1992), 989–1020.

[2] P.J. Rippon and G.M. Stallard, Fast escaping points of entire functions, *Proc. London Math. Soc.*, doi:10.1112/plms/pds001.

[3] P.J. Rippon and G.M. Stallard, Prescribed rates of escape for entire functions. In preparation.