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Weighted extremal domains and H^2-best rational approximants to algebraic functions

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Let f be an algebraic function holomorphic at infinity with all its singularities contained in the unit disk, $\mathbb{D}$. Let further r_n be a sequence of H^2-best rational approximants to f on the unit circle. We show that r_n converges in capacity to f in $\overline{\mathbb{C}} \setminus K$, the unique domain characterized by the property of minimal condenser capacity of the compact K relative to $\mathbb{D}$ among all compacts that make f single-valued, and that the counting measures of the poles of r_n weakly converge to the Green equilibrium distribution on K relative to $\mathbb{D}$. En route to this result we show that for any Borel probability measure ν, $\operatorname{supp}(\nu) \subset \overline{\mathbb{D}}$, there exists the unique weighted extremal domain $\overline{\mathbb{C}} \setminus \Gamma_\nu$ such that rational interpolants to f whose interpolation points are distributed asymptotically as ν^* converge to f in capacity in $\overline{\mathbb{C}} \setminus (\Gamma_\nu \cup \operatorname{supp}(\nu^*))$, where ν^* is the reciprocal measure of ν.

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