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Asymptotics for the zeros and poles of normalized Padé approximants to e^z

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ABSTRACT

With $s_n(z)$ denoting the n-th partial sum of e^z, the exact rate of convergence of the zeros of the normalized partial sums, $s_n(nz)$, to the Szegő curve $D_{0,\infty}$ was recently studied by Carpenter, Varga and Waldvogel (1993), where $D_{0,\infty}$ is defined by

$$D_{0,\infty} := \left\{ z \in \mathbb{C} : |\mathrm{z}\mathrm{e}^{1-\mathrm{z}}| = 1 \text{ and } |\mathrm{z}| \leq 1 \right\}.$$

Here, the above results are generalized to the convergence of the zeros and poles of certain sequences of normalized Padé approximants $R_{n,\nu}((n+\nu)z)$ to e^z, where $R_{n,\nu}(z)$ is the associated Padé rational approximation to e^z.