

Asymptotics of Hermite-Padé to the Exponential Function

Herbert Stahl

Hermite-Padé polynomials and approximants are in a very natural way generalizations of Padé approximants, continued fractions, and Taylor polynomials. However, the concept is more complex, and it has as a surprising new element by that the basic definitions split up in two essentially different directions. Historically, Hermite-Padé approximants are, perhaps, most famous for their role in Hermite's proof of the transcendency of the number e .

In the Seventies, in a series of papers, Ed Saff and Richard Varga have published ground breaking research about the asymptotic behavior, and especially about the zero distribution of Padé polynomials associated with the exponential function.

In the talk we will start with a review of some of Saff's and Varga's results, and will then show how their research has led to new research and new insights into the asymptotic behavior of quadratic Hermite-Padé polynomials associated with the exponential function.

Some new results of recent research will be discussed. Besides of the typical tools of constructive complex approximation, a specific compact Riemann surfaces will play a key role. Looking ahead beyond the quadratic case will show that there the analysis on even more complicated Riemann surfaces becomes necessary.