FROM TAYLOR TO QUADRATIC HERMITE-PADÉ POLYNOMIALS[*]

HERBERT STAHL[†]

Dedicated to Ed Saff on the occasion of his 60th birthday

Abstract. Taylor polynomials, Padé approximants, and algebraic Hermite-Padé approximants form a hierarchy of approximation concepts of growing complexity. In the present contribution we climb this ladder of concepts by reviewing results about the asymptotic behaviour of polynomials that are connected with the three concepts. In each case the concepts are used for the approximation of the exponential function. The review starts with a classical result by G. Szegö about the asymptotic behaviour of zeros of the Taylor polynomials, it is then continued with asymptotic results by E.B. Saff and R.S. Varga about the asymptotic behaviour of zeros and poles of Padé approximants, and in the last part, analogous results are considered with respect to quadatic Hermite-Padé polynomials. Here, known results are reviewed and some new ones are added. The new results are concerned with the non-diagonal case of quadatic Hermite-Padé polynomials.

Key words. Taylor series, Padé approximants, Hermite-Padé polynomials

AMS subject classifications. 41A21, 41A58, 41A63, 30B10