

## POLYNOMIALS WITH A SHARP CAUCHY BOUND AND THEIR ZEROS OF MAXIMAL MODULUS

HARALD K. WIMMER

*Abstract.* The moduli of zeros of a complex polynomial are bounded by the positive zero of an associated auxiliary polynomial. The bound is due to Cauchy. This note describes polynomials with a sharp Cauchy bound and the location of peripheral zeros.

*Mathematics subject classification (2010):* 11C08, 26C10, 15B48.

*Keywords and phrases:* Zeros of polynomials, Cauchy bound, companion matrix, nonnegative matrix.

### REFERENCES

- [1] N. ANDERSON, E. B. SAFF, AND R. S. VARGA, *On the Eneström–Kakeya theorem and its sharpness*, *Linear Algebra Appl.*, **28**, (1979), 5–16.
- [2] R. A. HORN AND CH. R. JOHNSON, *Matrix Analysis*, Cambridge University Press, Cambridge, 1985.
- [3] A. HURWITZ, *Über einen Satz des Herrn Kakeya*, *Tôhoku Math. J.* **4**, (1913), 89–93; in: *Mathematische Werke von A. Hurwitz*, 2. Band, 627–631, Birkhäuser, Basel, 1933.
- [4] M. MARDEN, *Geometry of Polynomials*, *Mathematical Surveys of the American Mathematical Society*, Vol. 3. Rhode Island, 1966.
- [5] C. D. MEYER, *Matrix Analysis and Applied Linear Algebra*, SIAM, 2000.
- [6] A. M. OSTROWSKI, *Solutions of Equations in Euclidean and Banach Spaces*, Academic Press, New York, 1973.
- [7] V. V. PRASOLOV, *Polynomials*, Springer, New York, 2004.
- [8] Q. I. RAHMAN AND G. SCHMEISSER, *Analytic Theory of Polynomials*, Oxford University Press, Oxford, 2002.
- [9] H. S. WILF, *Perron-Frobenius theory and the zeros of polynomials*, *Proc. Amer. Math. Soc.*, **12**, (1961), 247–250.