

STRIPS AND HYPERBOLAS FOR ZEROS OF POLYNOMIALS IN TERMS OF THEIR HERMITE EXPANSION

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Abstract. We obtain estimates for strips and hyperbolas containing all the zeros of a polynomial given by its Hermite expansion, by combining some ideas of Turán and the classical methods of Fujiwara, Ballieu, Cowling and Thron.

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REFERENCES

- [1] R. BALLIEU, *Sur les limitations des racines d'une équation algébrique*, Acad. Roy. Belg. Bull. Cl. Sci. (5), **33** (1947), 747–750.
- [2] D. BLEECKER AND G. CSORDAS, *Hermite expansions and the distribution of zeros of entire functions*, Acta Sci. Math. (Szeged), **67** (2001), 177–196.
- [3] V. F. COWLING AND W. J. THRON, *Zero-free regions of polynomials*, Amer. Math. Monthly, **61** (1954), 682–687.
- [4] V. F. COWLING AND W. J. THRON, *Zero-free regions of polynomials*, J. Indian Math. Soc. (N.S.), **20** (1956), 307–310.
- [5] M. FUJIWARA, *Über die obere Schranken des absoluten Betrages der Wurzeln einer algebraischen Gleichung*, Tôhoku Math. J., **10** (1916), 167–171.
- [6] A. GIROUX, *Estimates for the imaginary parts of the zeros of a polynomial*, Proc. Amer. Math. Soc., **44** (1974), 61–67.
- [7] N. R. JÖRGENSEN, *Undersøgler over frekvensflader og korrelation*, Copenhagen, Denmark Busck, 1916.
- [8] T. KOJIMA, *On a theorem of Hadamard's and its application*, Tôhoku Math. J., **5** (1914), 54–60.
- [9] T. KOJIMA, *The limits of the roots of an algebraic equation*, Tôhoku Math. J., **11** (1917), 119–127.
- [10] M. MARDEN, *Geometry of polynomials*, Mathematical Surveys and Monographs No. 3, A.M.S., Providence, Rhode Island, 1989.
- [11] O. PERRON, *Algebra*, vol. **II**, *Theorie der algebraischen Gleichungen*, Walter de Gruyter & Co., Berlin, 1951.
- [12] W. SPECHT, *Die Lage der Nullstellen eines Polynoms*, Math. Nachr., **15** (1956), 353–374.
- [13] W. SPECHT, *Die Lage der Nullstellen eines Polynoms II*, Math. Nachr., **16** (1957), 257–260.
- [14] W. SPECHT, *Die Lage der Nullstellen eines Polynoms III*, Math. Nachr., **16** (1957), 369–389.
- [15] W. SPECHT, *Die Lage der Nullstellen eines Polynoms IV*, Math. Nachr., **21** (1960), 201–222.
- [16] G. SZEGŐ, *Orthogonal polynomials*, Amer. Math. Soc. Coll. Publ., **23**, 102 (1939).
- [17] P. TURÁN, *Sur l'algèbre fonctionnelle*, Comptes du Premier Congrès des Mathématiciens Hongrois, (27 Août–2 Septembre 1950), Akadémiai Kiadó, Budapest, 1952, 279–290.
- [18] P. TURÁN, *Hermite-expansion and strips for zeros of polynomials*, Arch. Math., **5** (1954), 148–152.
- [19] P. TURÁN, *To the analytic theory of algebraic equations*, Izvestija Mat. Inst. Bulg. Akad. Nauk., **3** (1959), 123–133.

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