

Characterization of expansive polynomials by special determinants

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Abstract. A polynomial is expansive if all of its roots lie outside the unit circle. We define some special determinants involving the coefficients of a real polynomial and formulate necessary and sufficient conditions for expansivity using these determinants. We show how these conditions can be turned into an algorithm, which, for integer polynomials, avoids exponential coefficient growth. We also examine the question how close the roots of an expansive polynomial can be to the unit circle if the coefficients are integers. We give several lower bounds on this distance in terms of different measures of the polynomial (e.g., its height). The simplest one is derived by Liouville's inequality, but then we improve this result and give different bounds using our special determinants.

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