

Meeting: 998, Houston, Texas, SS 19A, Special Session on Algebraic Geometry

998-14-425 **J. Maurice Rojas*** (rojas@math.tamu.edu), Department of Mathematics, Texas A&M University, College Station, Texas 77843, and **Casey Stella** (casey.stella@math.tamu.edu), Department of Mathematics, Texas A&M University, College Station, Texas 77843. *A Complexity Threshold for Real Fewnomials*. Preliminary report.

Consider a polynomial f in $\mathbb{Z}[x_1, \dots, x_n]$ with exactly m monomial terms. Let FEWFEAS be the following problem:

Decide whether f has a real root or not.

Arguably, FEWFEAS is the most fundamental problem of real algebraic geometry. However, other than the fact that FEWFEAS is doable in polynomial time for $m \leq n + 1$, little is known about its complexity. So we give a nearly sharp threshold for the set of m making FEWFEAS NP-hard: We show that for $m = O(n)$, FEWFEAS is NP-hard. The best previous bound was $O(n^4)$. (Received March 08, 2004)