Meeting: 1003, Atlanta, Georgia, SS 34A, AMS Special Session on Algorithmic Algebraic and Analytic Geometry, I

1003-14-1343 **J Maurice Rojas*** (rojas@math.tamu.edu), TAMU 3368, Texas A&M University, College Station, TX 77845-3368. *Some Speed-Ups and Speed Limits for Real Fewnomials.*

We present some new algorithmic results on deciding the existence of real roots for systems of sparse polynomial equations over the real numbers. In particular:

1. We show that deciding the existence of real roots for a single n-variate m-nomial is **NP**-hard for $m \geq 6n+6$ (and n arbitrary).

2. A polynomial time algorithm for guessing (with success probability $1-\varepsilon$) the existence of real roots for polynomials in one variable.

Both results above are stated relative to the sparse encoding, thus circumventing the usual upper and lower complexity bounds clasically stated solely in terms of degree. We also remark that deciding the existenceof real roots for a univariate 4-nomial in (deterministic) polynomial time remains an open problem.

Result (1) is joint work with Casey Stella of Texas A&M University. (Received October 04, 2004)