1027-33-9 **Robert P. Boyer*** (rboyer@drexel.edu), Department of Mathematics, Drexel University, Philadelphia, PA 19104, and **William M. Y. Goh** (wgoh@math.drexel.edu), Department of Mathematics, Drexel University, Philadelphia, PA 19104. *The Asymptotic Zero Distribution for Partition Polynomials.*

There are a number of intriguing examples of zeros of polynomials from combinatorics and number theory given by Richard Stanley. Let $p_k(n)$ the number of partitions of n with exactly k parts. Stanley defined the partition polynomial $F_n(x)$ as $\sum_{k=1}^{n} p_k(n)x^k$ and plotted the zeros for degree 200. They cluster about the unit circle with a sparse family inside.

With extensive numerical computation up to degree 50000 and using Dirichlet L-functions, harmonic function theory, and the Hardy-Ramanujan circle method, we found asymptotic expansions for $F_n(x)$ which allowed us to determine that the zeros of $F_n(x)$ as $n \to \infty$ approach the unit circle as well as portions of the implicit curves $f_1(x) = f_2(x)$, $f_1(x) = f_3(x)$, and $f_2(x) = f_3(x)$ where $f_k(z) = \Re[\sqrt{\mathrm{Li}_2(z^k)}]/k$ where Li_2 is the dilogarithm.

The asymptotic expansion further showed that the zeros of $F_n(x)$ exhibit an unusual two-scale behavior: with $O(n)$ zeros outside the unit disk while only $O(\sqrt{n})$ inside. (Received December 14, 2006)