1120-33-216 **Thomas Joachim Bothner*** (`bothner@umich.edu`), 2074 East Hall, 530 Church Street, Ann Arbor, MI 48109. *Zeros of large degree Vorob'ev-Yablonski polynomials via a Hankel determinant identity.*

It is well known that all rational solutions of the second Painlevé equation and its associated hierarchy can be constructed with the help of Vorob'ev-Yablonski polynomials and generalizations thereof. The zero distribution of the aforementioned polynomials has been analyzed numerically by Clarkson and Mansfield and the authors observed a highly regular and symmetric pattern: for the Vorob'ev polynomials itself the roots form approximately equilateral triangles whereas they take the shape of higher order polygons for the generalizations.

Very recently Buckingham and Miller completely analyzed the zero distribution of large degree Vorob'ev-Yablonski polynomials using a Riemann-Hilbert/nonlinear steepest descent approach to the Jimbo-Miwa Lax representation of PII equation. In our work we rephrase the same problem in the context of orthogonal polynomials on a contour in the complex plane. The polynomials are then analyzed asymptotically and the zeros localized through the vanishing of a theta divisor on an appropriate hyperelliptic curve.

Our approach starts from a new Hankel determinant representation for the square of the Vorob'ev-Yablonski polynomial. This identity is derived using the representation of Vorob'ev polynomials as Schur functions. (Received February 22, 2016)