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Moody T. Chu* (chu@math.ncsu.edu), Department of Mathematics, North Carolina State University, Raleigh, NC 27695-8205. *Orthogonal Polynomials, Moments, Measure Deformation, Dynamical Systems, and SVD Algorithm.*

Iterates generated from discrete dynamical systems such as the QR algorithm and the SVD algorithm are time-1 samples of solutions to the Toda lattice and the Lotka-Volterra equation, respectively. In this talk we present some recent discoveries that connect diverse topics such as soliton theory, integrable systems, continuous fractions, τ functions, orthogonal polynomials, Sylvester identity, moments, and Hankel determinants together. Of particular interest are the three facts that

1. Each of the Toda lattice and the Lotka-Volterra equation governs the evolution of a certain class of orthogonal polynomials whose orthogonality is determined by a specific time-dependent measure.
2. Since the measure deformation is explicitly known, moments can be calculated which, when properly assembled, lead to the conclusion abstractly, but literally, that the iterates of the QR algorithm and the SVD algorithm can be expressed in closed-form!
3. Hankel determinantal solutions are too complicated to be useful. However, a “smart” integrability-preserving discretization of the Lotka-Volterra equation can yield a new SVD algorithm.

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