1097-35-299 **Alexander Tovbis*** (alexander.tovbis@ucf.edu), Orlando, FL 32816. *Painlevé transcendents and universality of transitions at the point of gradient catastrophe for some integrable systems and orthogonal polynomials: the Riemann-Hilbert Problem approach.*

Using the nonlinear steepest descent (Deift-Zhou) method for Riemann-Hilbert problems, we give the leading order description (with error estimates) of the point of gradient catastrophe for the focusing NLS in terms of the tritronquée solution to the Painlevé I (P1) and rational breathers for the NLS.

Similar phenomenon (double scaling limit) was studied for the asymptotic of recurrence coefficients for orthogonal polynomials with complex varying weight $e^{-N(\frac{1}{2}z^2+\frac{1}{4}tz^4)}$ on the cross near the critical values of the parameter $e^{-N(\frac{1}{2}z^2+\frac{1}{4}tz^4)}$ that are governed by P1. We also study the global asymptotic regime for complex t and another crtical point $t_2 = \frac{1}{4}$ that is governed by P2. It is interesting to note that in some cases the singular behavior of the recurrence coefficients near t_2 occurs away from the poles of the corresponding P2 transcendents. This is a join work with Marco Bertola. (Received January 28, 2014)