

**Meeting:** 1005, Newark, Delaware, SS 10A, Special Session on Symmetry Methods for Partial Differential Equations

1005-35-44            **Peter A Clarkson\*** (P.A.Clarkson@kent.ac.uk), Institute of Mathematics, Statistics & Actuar,  
University of Kent, CT2 7NF Canterbury, Kent, England. *Rational solutions of the soliton  
equations.*

In this talk I shall discuss special polynomials associated with rational solutions for the second Painlevé equation (PII) and the fourth Painlevé equation (PIV) and associated special polynomials associated with rational solutions of soliton equations which are solvable by the inverse scattering method, including the Korteweg-de Vries, modified Korteweg-de Vries and nonlinear Schrödinger equations.

Rational solutions of the Painlevé equations are expressible in terms of the logarithmic derivative of certain special polynomials. The locations of the roots of these polynomials is shown to have a highly regular structure in the complex plane.

It is well known that soliton equations have symmetry reductions which reduce them to the Painlevé equations. Hence rational solutions of soliton equations arising from symmetry reductions of the Painlevé equation can be expressed in terms of the aforementioned special polynomials. The motion of the poles of more general rational solutions of equations in the Korteweg-de Vries and modified Korteweg-de Vries hierarchies, and the motion of zeroes and poles of rational and rational-oscillatory solutions of the nonlinear Schrödinger equation will be discussed. (Received January 20, 2005)