

Special polynomials associated with rational and algebraic solutions of the Painlevé equations

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The Painlevé equations (P_I – P_{VI}) are six nonlinear ordinary differential equations that have been the subject of much interest in the past thirty years, which have arisen in a variety of applications such as random matrices and may be thought of as nonlinear special functions. Rational solutions of the Painlevé equations are expressible in terms of the logarithmic derivative of certain special polynomials. For P_{II} these polynomials were first derived in the 1960's by Yablonskii and Vorob'ev. Recently it was shown that the locations of the roots of these polynomials have a highly regular triangular structure in the complex plane.

In this talk I shall describe the analogous special polynomials associated with rational and algebraic solutions of other Painlevé equations and equations in the Painlevé hierarchies. It is shown that their roots also have a highly regular structure and other properties of these special polynomials will also be discussed.