

Umemura polynomials for Painlevé third equation

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It is well known in the theory of Painlevé equations that their rational solutions are associated with a sequence of polynomials. These polynomials satisfy a nonlinear recurrence formula. Fukutani-Okamoto-Umemura and Taneda independently gave a direct algebraic proof that solutions of those recurrence formulas related to P_2 and P_4 are indeed polynomials (called Okamoto polynomials). We shall show directly that the solutions of the nonlinear recurrence formulas corresponding to P_3 are indeed polynomials (called Umemura polynomials). Our method should also work for those Umemura polynomials related to P_5 .

This is joint work with my student Chia-Hua Lin.