



SEMINAR

Grupo de Análise Funcional e Aplicações Functional Analysis and Applications Group

Asymptotic distribution of singularities of solutions to ODEs in the complex plane

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Abstract

In this talk I will briefly introduce the six Painleve equations, which are the only second order nonlinear ODEs whose solutions extend to the complex plane as meromorphic functions.

Afterwards, I will present a family of special solutions to the Painleve IV equation, whose singularities coincide with the roots of the generalised Hermite polynomials $H_{m,n}(z)$ (here m,n are two arbitrary positive integers).

I will show that roots of the generalised Hermite polynomials are encoded in the solution of a boundary value problem for a second order linear operator, which I will analyse to obtain the main results of the talk: the computation of the number of real roots of $H_{m,n}(z)$ and the asymptotic distribution of roots of $H_{m,n}(z)$ for $|n + m|$ large. These generalises classical results about Hermite polynomials, see e.g. 'Higher transcendental functions, vol. II, chap. X'

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