Уральский федеральный университет

Кафедра математического анализа

Budapest University of Technology and Economics

MŰEGYETEM 1782

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Агота Хорват (Ágota Horváth)

Прочтёт в среду 15 февраля в 12:50 в Институте естественных наук и математики Уральского федерального университета (ул. Тургенева, 4, ауд. 513) лекцию

"How to generalize classical notions? – Orthogonal polynomials, as you like it"

What is lost on the swings
is made up on the roundabouts

Classical orthogonal polynomials (Hermite, Laguerre, Jacobi) has several generalizations. Staying on (a subset of) the real line one can mention orthogonal polynomial systems with respect to general measures or weight functions (general Jacobi, Freud, Erdős or exponential weights). Although these orthogonal polynomials do not form an eigenfunction system of a certain differential operator, but they form a closed system and fulfil the usual properties of the classical polynomials, namely they have three-term recurrence relation, differential equation, etc. This concept has a rich literature from the 1980’s to present times.

Recently (around 2009) investigations in quantum mechanics led to introducing some new systems of polynomials in a different way. These are the so-called exceptional orthogonal polynomials. Like the classical examples, they are eigenfunctions of a second-order differential operator, but the sequence of eigenfunctions need not contain polynomials of all degrees, even though the full set of eigenfunctions still forms a basis of the weighted L^2 space. They fulfil some higher term recurrence relations and also have a Bochner-type characterization. The aim of this lecture is giving some picture on this quickly developing concept of orthogonal polynomials.

Выступит с научным докладом в субботу 18 февраля в 10:40 (ул. Тургенева, 4, ауд. 513)

"On the zeros of exceptional orthogonal polynomials"

Exceptional orthogonal polynomials are eigenpolynomials of a second order differential operator and are orthogonal with respect to a weight function on a real interval, I. Although exceptional families need not contain polynomials of all degrees, they form a closed system in the weighted L^2 space.

Exceptional polynomials have regular zeros in I, and exceptional zeros out of I. We examine the electrostatic properties of exceptional and regular zeros of exceptional Laguerre and Jacobi polynomials. Since there is a close connection between the electrostatic properties of the zeros and the stability of interpolation on the system of zeros, we can deduce an Egerváry-Turán type result as well. The limit of the energy on the regular zeros is also investigated.

Since the exceptional zeros of exceptional Hermite polynomials are complex, the situation here is different. We localize the eigenvalues of the Hessianin general cases. In some special arrangements we can state more precise result on behavior of the energy function.

Приглашаются все желающие!