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MATHEMATIKKOLLOQUIUM

Das Institut für Mathematik lädt zu folgendem Vortrag ein:

Hermann König

Christian-Albrechts-Universität zu Kiel

On the Leibniz and the Chain Rule Operator Equation

Professor Hermann Koenig is a world-class functional analyst well known for his research work on the geometry of Banach spaces, operator ideals, eigenvalue distribution of Riesz operators, volumes of convex bodies and the asymptotic theory of high-dimensional normed spaces. He has written a book on eigenvalue distribution of compact operators and several excellent surveys on the isometric theory of Banach spaces, and on the eigenvalues of operators and their applications. Recently he has also studied operator functional equations which characterize classical operators.

Zeit: **Donnerstag, den 28. November 2013 um 17:15 Uhr**

Ort: **Bauing.-Gebäude, Technikerstraße 13, HSB 1**

Gäste sind herzlich willkommen!

Eva Kopecká

Abstract.

The Leibniz product rule and the chain rule

$$D(f\cdot g)=D(f)\cdot g+f\cdot D(g)\ ,\ D(f\circ g)=D(f)\circ g\cdot D(g)$$

are basic formulas for calculating derivatives $D(f)$ of functions f . We consider the simple question which operators $T:C^1(\mathbb{R})\to C(\mathbb{R})$ besides the derivative satisfy one of the equations

$$T(f\cdot g)=T(f)\cdot g+f\cdot T(g)\ ,\ T(f\circ g)=T(f)\circ g\cdot T(g)$$

for all $f,g\in C^1(\mathbb{R})$. Here $C(\mathbb{R})$ and $C^1(\mathbb{R})$ are the continuous resp. continuously differentiable functions from $\mathbb{R}$ to $\mathbb{R}$. It turns out that there are fewer solution operators than one might think. We also consider analogues of these rules for the second derivative and give a characterization of the Laplace operator by such equations and a standard invariance property. The second order Leibniz rule type equation has the form

$$T(f\cdot g)=T(f)\cdot g+f\cdot T(g)+Af\cdot A(g)$$

for unknown operators $T,A:C^2(\mathbb{R})\to C(\mathbb{R})$. This is joint work with Vitali Milman.