

SEMINAR ON ORDINARY DIFFERENTIAL EQUATIONS AND INTEGRATION THEORY

Special session in honor of the 85th birthday of

Jaroslav Kurzweil



April 28, 2011

Institute of Mathematics, Academy of Sciences of the Czech Republic
("Blue" Lecture Hall)

10.00-10.45 **Pavel Krejčí** [MÚ AV ČR, Praha]

Kurzweil quasivariational inequalities.

Discontinuous processes in mechanical systems with moving convex constraints can be described in an elegant way by means of evolution quasivariational inequalities in Kurzweil integral form. The main advantage of the Kurzweil formalism consists in its simplicity and natural physical interpretation. The proof of continuous data dependence in the space of regulated functions and in BV follows in a straightforward way from basic principles of the Kurzweil calculus. Furthermore, the left continuous Kurzweil solution coincides with the standard viscous limit, and the energy balance on jumps comes out as a direct consequence of the integration by parts formula.

10.55-11.40 **Pavol Brunovský** [FMFI UKo, Bratislava]

"Analitičeskoje konstruovanie regul'atorov" and bubbles in economics.

We recall a 1961 result of Jaroslav Kurzweil in optimal control theory and discuss its connection to the "stable path" concept in the macroeconomic theory of rational expectations as well as in "real business cycle" and "dynamic stochastic general equilibrium" models. We argue that if we believe into those models then bubbles do not come as a surprise.

11.50-12.35 **Marian Fabian** [MÚ AV ČR, Praha]

Coincidence of Pettis and McShane integrability.

McShane integral is a close relative of Kurzweil-Henstock integral. If K is a compact space, then any function $f: [0,1] \rightarrow C(K)$ which is McShane integrable, is also automatically Pettis integrable. We focus on conditions on K under which the converse holds. If K is a uniform Eberlein compact, then the both integral coincide (Deville, Rodriguez) while there exist an Eberlein compact K and a scalarly null (hence Pettis integrable) $f: [0,1] \rightarrow C(K)$ which is not McShane integrable (Aviles, Plebanek, Rodriguez). We try to study/diminish the slot in between these two results. A central concept behind this problem is the so called MC-filling of a family of sets. Several (counter)examples in this direction are presented and discussed.

Lunch break

14.00-14.45 **Jan Malý** [MFF UK, Praha]

Integration with respect to distributions.

We introduce a kind of integral of a function with respect to a distribution. This integral makes sense even in the metric space setting and allows establishing new versions of the Gauss, Green and Stokes formulas. The talk is based on a joint work with Kristýna Kuncová.

14.55-15.40 **Pavel Drábek** [ZČU, Plzeň]

Some of the consequences of the nonuniqueness of the initial value problem for equations of the second order.

We prove the existence of new type solutions of the modified Fischer-Kolmogorov equation with slow/fast diffusion and with possibly non smooth double-well potential. We show that a certain relation between the rate of the diffusion and the smoothness of the potential may originate new type solutions which do not occur in the classical Fischer-Kolmogorov equation. The main focus of this note is to show the sensitivity of the mathematical modelling with respect to the chosen form of the diffusion term and the shape of the double-well potential.