Fachbereich Mathematik und Informatik

Freie Universität Berlin

Seminar for Partial Differential Equations 1

Summer 2019

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This will take place on Mondays 10 - 12 in SR 130/A3 Seminarraum (Arnimallee 3 HH). Attendance at all talks is compulsory.

There will be a **second short organizational meeting** on Monday 06.05.2019 at 11.30 am (sharp) at this venue. Attendance is compulsory for all participants. Please carefully read this final information sheet beforehand.

The first talk will take place on Monday 20.05.2019. I have been able to accommodate all your requests regarding topics.

Prerequisites for the first four talks are Analysis 1 - 3 and Linear Algebra 1 and 2. In order to understand the last topic some basic knowledge of the differential geometry of curves in the plane is useful but not required. Ms Schloß, who has acquired this background during the previous semester will surely be gentle on you. Some of the talks are relevant to theoretical physics, but no background knowledge is required here.

All seminar topics (except the last one) correspond to sections in the monograph

[Ev], *Lawrence C. Evans, Partial Differential Equations, Graduate Studies in Mathematics, Vol.19, American Mathematical Society, 1998*

which is also the main reference for the lecture course *Partial Differential Equations 1.*

List of talks

20.05.2019: Maria Mathew: Euler - Lagrange systems and the Brouwer fixed point theorem ([Ev], 8.1.4 p. 437 - 442)

27.05.2019: Gentaro Masuda: Method of characteristics ([Ev], 3.2.1 and 3.2.2, p. 97 - 102)

03.06.2019: Margarita Kostré: Nonexistence of solutions ([Ev], 9.4, p. 511 - 517)

17.06.2019: Yuval Wyborski: Radial symmetry of solutions ([Ev], 9.5.1 and 9.5.2 p. 517 - 522)

24.06.2019: Siwalai Schloß: The curve-shortening flow

I will point out connections between talks as well as to other areas of mathematics and to theoretical physics during the seminar. For example, the first talk is related to classical mechanics, while the talks by Ms Kostré and and Ms Schloß both deal with blow-up

behaviour of reaction-diffusion equations. I will explain this also to the speakers before their talks. *Nonexistence* can for instance refer to a phenomenon where solutions of certain equations cease to exist after a certain finite time. This is often called *blow-up* or *singularity* behaviour, depending on the mathematical and/or scientific community where these equations are used.