Nonlinear parabolic equations with p-adic spatial variables

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ABSTRACT

In this survey talk, we consider linear and nonlinear evolution equations for complex-valued functions of a real positive time variable and p-adic spatial variables. In the linear case, there is a well-developed theory of the class of p-adic parabolic equations having both common and different features compared with the classical theory of parabolic equations. In the nonlinear case, we deal with non-Archimedean counterparts of the fractional porous medium equation [1] and the Navier-Stokes equation [2].

Developing, as a tool, an L^q-theory of Vladimirov's p-adic fractional differentiation operator ($1 < q < \infty$), we prove m-accretivity of the nonlinear operator corresponding to the equation of the porous medium type, thus obtaining the existence and uniqueness of a mild solution. We also prove the local solvability of the p-adic Navier-Stokes equation.

References

[1] A. Khrennikov and A. N. Kochubei. p-Adic analogue of the porous medium equation. J. Fourier Anal. Appl. 24 (2018), 1401–1424.

[2] A. Khrennikov and A. N. Kochubei. On the p-adic Navier–Stokes equation, Applicable Analysis, published online 16 Oct 2018, DOI: 10.1080/00036811.2018.1533120.