

# Non-Archimedean Radial Calculus

Anatoly N. Kochubei

Institute of Mathematics,  
National Academy of Sciences of Ukraine,  
Tereshchenkivska 3, Kiev, 01024 Ukraine  
E-mail: kochubei@imath.kiev.ua

We consider a restriction of Vladimirov's fractional differentiation operator  $D^\alpha$ ,  $\alpha > 0$ , to complex-valued radial functions on a non-Archimedean field. In particular, it is found to possess such a right inverse  $I^\alpha$  that the appropriate change of variables reduces equations with  $D^\alpha$  (for radial functions) to integral equations whose properties resemble those of classical Volterra equations. In other words, we found, in the framework of non-Archimedean pseudo-differential operators, a counterpart of ordinary differential equations. We study nonlinear equations of this kind, find conditions of their local and global solvability. Next, we begin an operator-theoretic investigation of the operator  $I^\alpha$ , and study a related analog of the Laplace transform.