Multidimensional Tauberian theorems for regularizing transforms

S. Pilipović
Faculty of Sciences and Mathematics,
University of Novi Sad

Abstract.

We provide Abelian and Tauberian theorems for regularization transforms of Banach-valued tempered distributions, that is, transforms of the form $M^{\mathbf{f}}_{\varphi}(x,y) = (\mathbf{f} * \varphi_{\mathbf{y}})(\mathbf{x})$, where φ is a test function and $\varphi_y(\cdot) = y^{-n}\varphi(\cdot/y)$. If the first moment of φ vanishes it is a wavelet type transform; otherwise, we say it is a non-wavelet type transform. Both cases at finite points and at infinity are studied. It is shown that the asymptotic properties of distributions can be completely characterized by boundary asymptotics of the wavelet and non-wavelet transforms plus natural Tauberian hypotheses. We apply Tauberian type results for Banach-valued distributions to spaces introduced by Mayer and Boni in the local and microlocal analysis, to regularity theory within generalized function algebras, to the stabilizations of solutions for a class of Cauchy's problems, for example $u_t = \Delta^{2k}u$ and to Tauberian theorems for the Laplace transform leading to a new proof of some classical theorems, for example the Littlewod theorem.

Joint results of J. Vindas and S. Pilipovic