WAVELET TRANSFORM ON SPACES OF TYPE W

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ABSTRACT. The continuous wavelet transform is studied on certain Gelfand Shilov spaces of type W. The continuity and boundedness results for continuous wavelet transform are obtained on some suitably designed spaces of type W defined on $\mathbf{R} \times \mathbf{R}_+, \mathbf{C} \times \mathbf{R}_+$ and $\mathbf{C} \times \mathbf{C}$.

1. Introduction. The spaces of W-type were studied by Gelfand and Shilov [**2**]. They investigated the behavior of Fourier transformation on W-spaces. Also, W-spaces are applied to the theory of partial differential equations.

Pathak [**4**] and van Eijndhoven and Kerkhof [**1**] introduced new spaces of W-type and investigated the behavior of Hankel transformation over them.

The wavelet transform on Schwartz space $\mathcal{S}(\mathbf{R})$ and spaces of Sobolev type have been studied by many authors, see for example Holschneider [**3**]. In this paper, motivated by the work of Pathak [**5**] and Pathak and Upadhyay [**6**] we recall characterizations of W-type spaces introduced in [**2**] and study the behavior of continuous wavelet transform over them.

The continuous wavelet transform of a function ϕ with respect to the wavelet ψ is defined by

$$(1.1) \qquad (\mathcal{W}_\psi \phi)(\sigma, a) = \widetilde{\Phi}(\sigma, a) = \int_{-\infty}^{\infty} \phi(t) \overline{\psi\left(\frac{t - \sigma}{a}\right)} \frac{dt}{a},$$

provided the integral exists, where $a \in \mathbf{R}_+$ and $\sigma \in \mathbf{R}$. If $\phi \in L^2(\mathbf{R})$ and $\psi \in L^2(\mathbf{R})$, then using the Parseval formula for Fourier transform,