

1079-42-320

Uwe Kähler* (ukaehler@ua.pt), Department of Mathematics, University of Aveiro, 3810-193 Aveiro, Portugal. *Gabor frames in Dirac analysis.*

In recent years there is an increased interest in image processing using hypercomplex signals, useful due to the representation of 2D signals into a quaternion-valued frequency domain. The two main approaches are the hypercomplex signal by Blöow and the monogenic signal by Felsberg and Sommer. While there is a lot of work done regarding interpretation of the phase, Hilbert pairs, hypercomplex wavelets, etc. not much is done regarding the discretization of the corresponding Gabor transform. This is mainly due to the lack of the necessary tools, such as the Zak transform or the Bargmann transform in the corresponding function theories. Here we discuss the construction of such tools, derive several of their properties, and the discretization of a suitable representation for the Gabor kernel. Moreover, we are interested in the critical case, that is to say, the case in which the Gabor system generated by the window is a Riesz basis and, therefore, it yields unique unconditionally convergent expansions where the coefficients stably encode the norm of the signal. Finally, we prove the Balian-Low theorem for the associated Gabor system, a theorem which expresses the fact that time-frequency concentrations are incompatible with non-redundancy for orthonormal Gabor systems. (Received January 17, 2012)