The **TF-TS** pop-up menu

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This text presents a brief explanation of the functionalities the **TF-TS** pop-up menu.

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1 Overview

This menu gathers utilities related to time-frequency and time scale transforms. More precisely, it allows to compute discrete and continuous wavelet transforms and pseudo-affine Wigner transforms. The discrete and continuous wavelet transforms windows (as well as the programs) are the same as the ones present in other areas of **Fraclab**, while the computation of the pseudo-affine Wigner transform is available only in this menu.

2 Continuous WT

This menu allows you to compute the continuous wavelet transform of 1D signals. As said above, the **Continuous Wavelet Transform** sub-menu is almost exactly the same as the one that appears in the **1D Exponents Estimation** and **1D Multifractal Spectra** estimation menus. For convenience, we recall here its main features. Check your input signal and **Refresh** it if needed. You need then to tune the **fmin** and **fmax** values, which are the minimum and maximum frequencies of analysis. The default values are the ones yielding maximal span compatible with the size of the signal. You may change the extreme frequencies either by typing values under **fmin** and **fmax**, or by using the predefined values on the menus to the right. The **Voices** parameters governs the number of intermediate frequencies at which the continuous wavelet coefficients will be computed. Be warned that giving an excessive number of voices may result in large computing times for long signals. You may then decide if you want to use an L2 (the default) or an L1 normalization for your wavelet. This feature is the only one that is present in this menu and not in

the continuous wavelet computations of other parts of **Fraclab**. Checking the **Mirror** item will deal the border effects by mirroring the signal at its extremities. Otherwise, zero-padding is used. Finally, you may choose the **Size** and **Type** of your analyzing wavelet: available wavelets are the **Mexican Hat**, and the real and analytic **Morlet** wavelets. The size may be any positive number (this parameter is not available for the Mexican hat). Once all the parameters that define the wavelet transform are chosen, hit **Compute WT**. The output signal is a matrix of size "number of voices" x "size of the original signal". It is called *cwt_signal#*, if "signal" is the name of your data, and where # is as usual an incremental parameter. You may visualize the continuous wavelet transform using the **View** menu. Note that **Fraclab** recognizes wavelet transforms, and display them differently form regular images. In particular, it uses a fixed aspect ratio (this is useful for instance if the number of voices is much smaller than the size of the signal), and the "jet" color-map, which often allows to highlight the important structures. If you want to view the transform as a normal image, or make other changes in the appearance, use the functionalities of the **View** menu described in the **Overview** help file.

3 Discrete WT

Contrarily to both the continuous wavelet transform and the pseudo-affine Wigner transform menus, you may here input 1D or 2D signals, and get their discrete wavelet transform. As said in the overview, this window is exactly the same as the one that appears in the **1D Multifractal Spectra** estimation menu (except in the **1D Multifractal Spectra** estimation menu you cannot compute transforms of images). Briefly, select first your **Input Signal** using the **Refresh** button. You may then choose the analyzing **Wavelet** from a choice of various Daubechies and Coiflet wavelets. Specify next the number of **Octaves**, i.e. on how many scale levels you wish to perform the analysis. On pressing **Compute**, the output signal *dwt_sig#* will be created.

4 Pseudo-affine Wigner Transform

The pseudo-affine Wigner transform is only implemented for 1D signals. The organization is the same as for the continuous wavelet transform, with some minor variations. Tune first the **fmin** and **fmax** values, which are the minimum and maximum frequencies of analysis. The default values are the ones yielding maximal span compatible with the size of the signal. You may change the extreme frequencies either by typing values under **fmin** and **fmax**, or by using the predefined values on the menus to the right. Choose then the value of the parameter **K** from a choice of -1, 0, 0.5, 2 or enter your own choice. The **Voices** parameters governs the number of intermediate frequencies at which the continuous wavelet coefficients will be computed. Be warned that giving an excessive number of voices may result in large computing times for long signals. You may then decide to perform some **Smoothing** by entering a number in the corresponding box. Finally, you may choose the **Size** and **Type** of your analyzing wavelet: available wavelets are the **Mexican Hat**, and the real and analytic **Morlet** wavelets. The size may be any positive number (this parameter is not available for the Mexican hat). Once all the parameters are set, hit **Compute**. The output signal is a matrix of size "number of voices" x "size of the original signal". It is called *paw_signal#*. You may visualize the continuous wavelet transform using the **View** menu. Note that **Fraclab** recognizes pseudo-affine Wigner transforms, and display them differently form regular images. In particular, it uses a fixed aspect ratio (this is useful for

instance if the number of voices is much smaller than the size of the signal), and the "jet" color-map, which often allows to highlight the important structures. If you want to view the transform as a normal image, or make other changes in the appearance, use the functionalities of the **View** menu described in the **Overview** help file.

5 Known bugs

Sometimes, the windows corresponding to the computations of the three transforms above will not close when pressing **Close**. When this happens, just close them using more drastic means.