YAWTB : *Yet Another Wavelet ToolBox*

http://www.fyma.ucl.ac.be/projects/yawtb/

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P. Vandergheynst (Sig. Proc. Inst., EPFL, Switzerland)

A. Rivoldini (Royal Observatory of Belgium)

Map

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2. Main purposes of this tool

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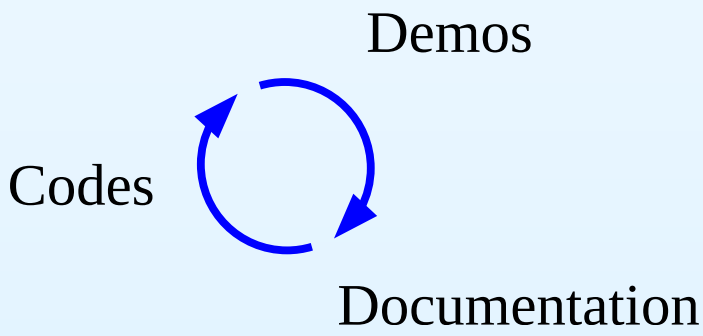

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- Various useful tools: (universal *yashow*, special functions, thresholdings, (P)SNR, frequency grid, ..),

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- Spherical DOG frame (half continuous and discrete)
- Multiselectivity analysis of images

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CWT 1D Given a signal s, and a wavelet ψ:

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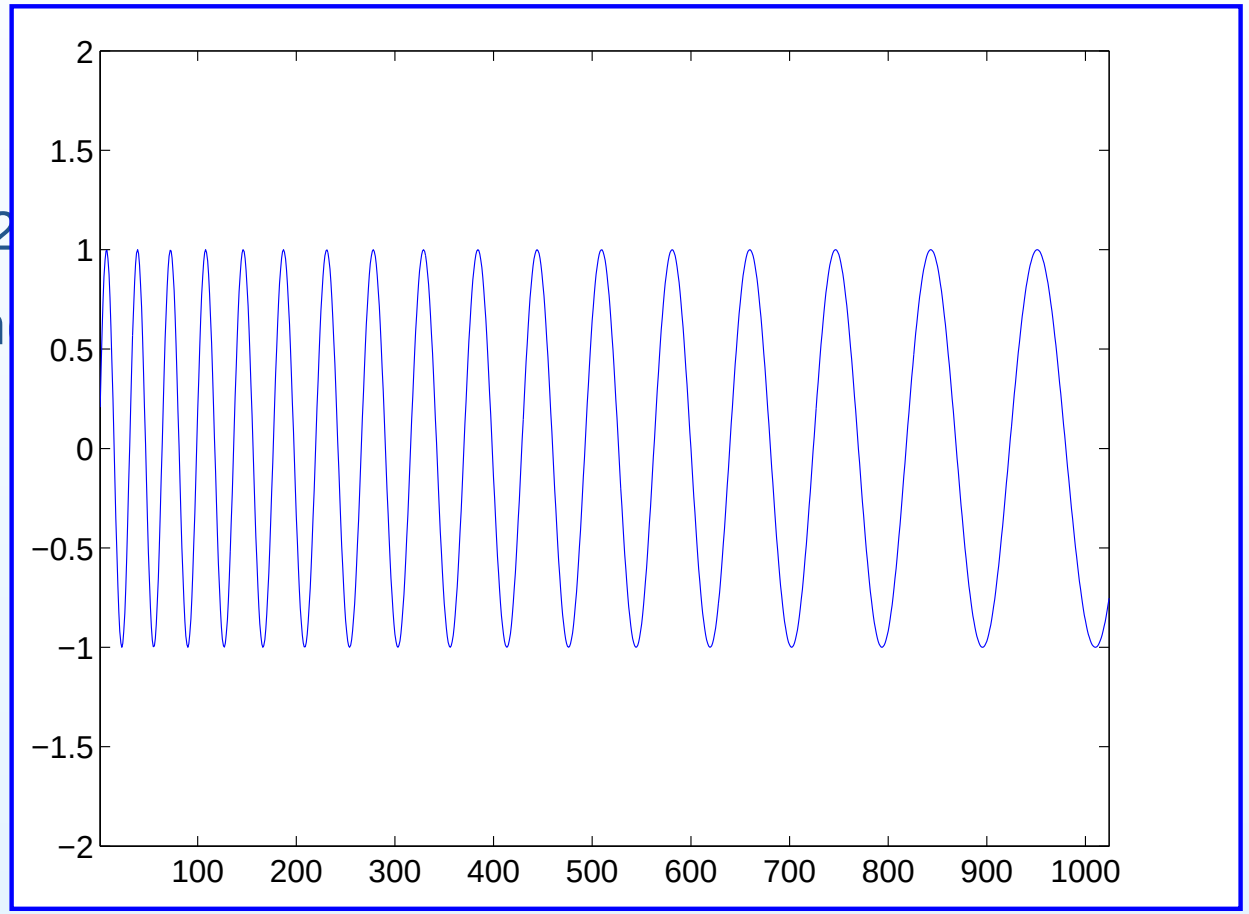

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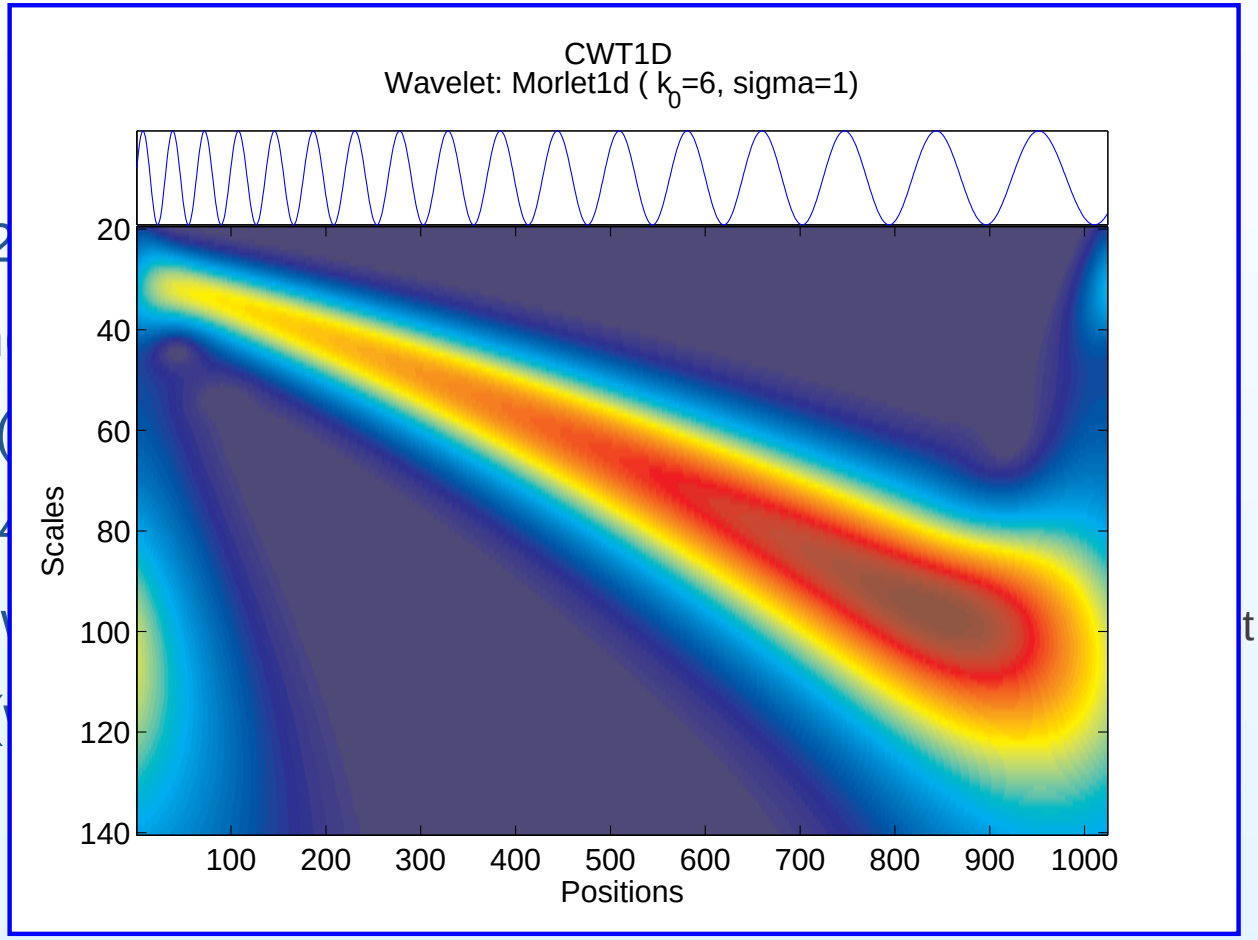

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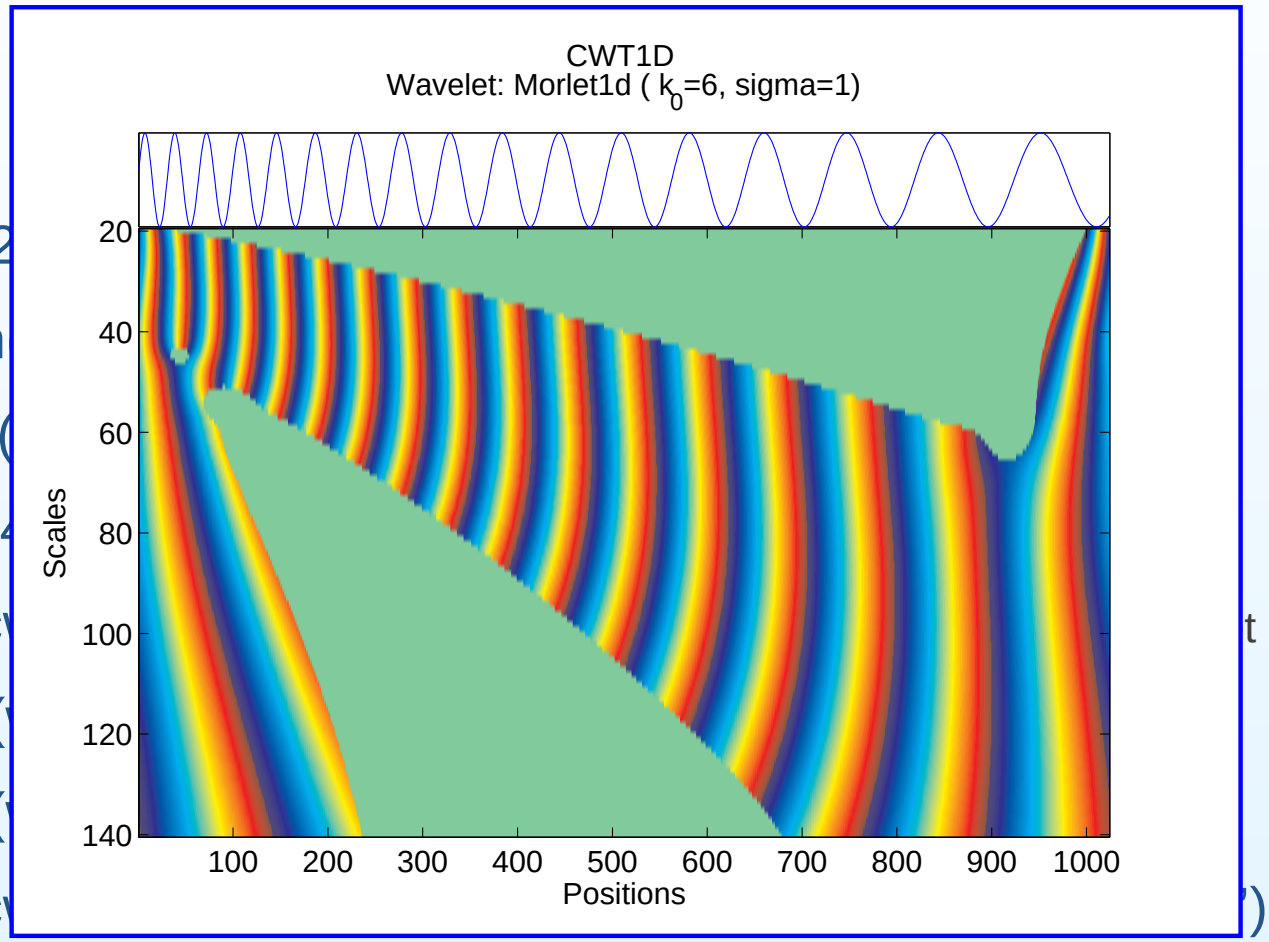

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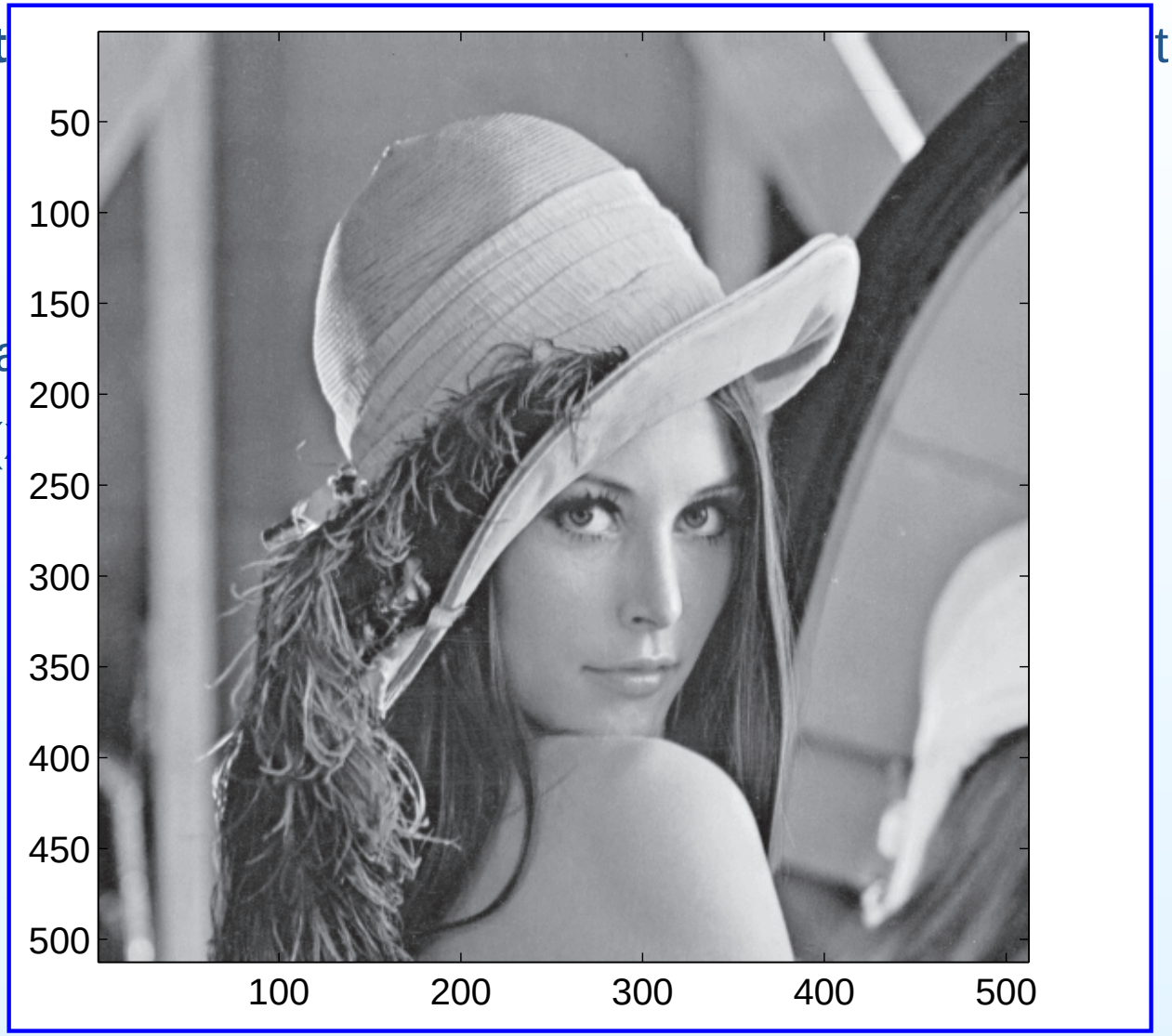

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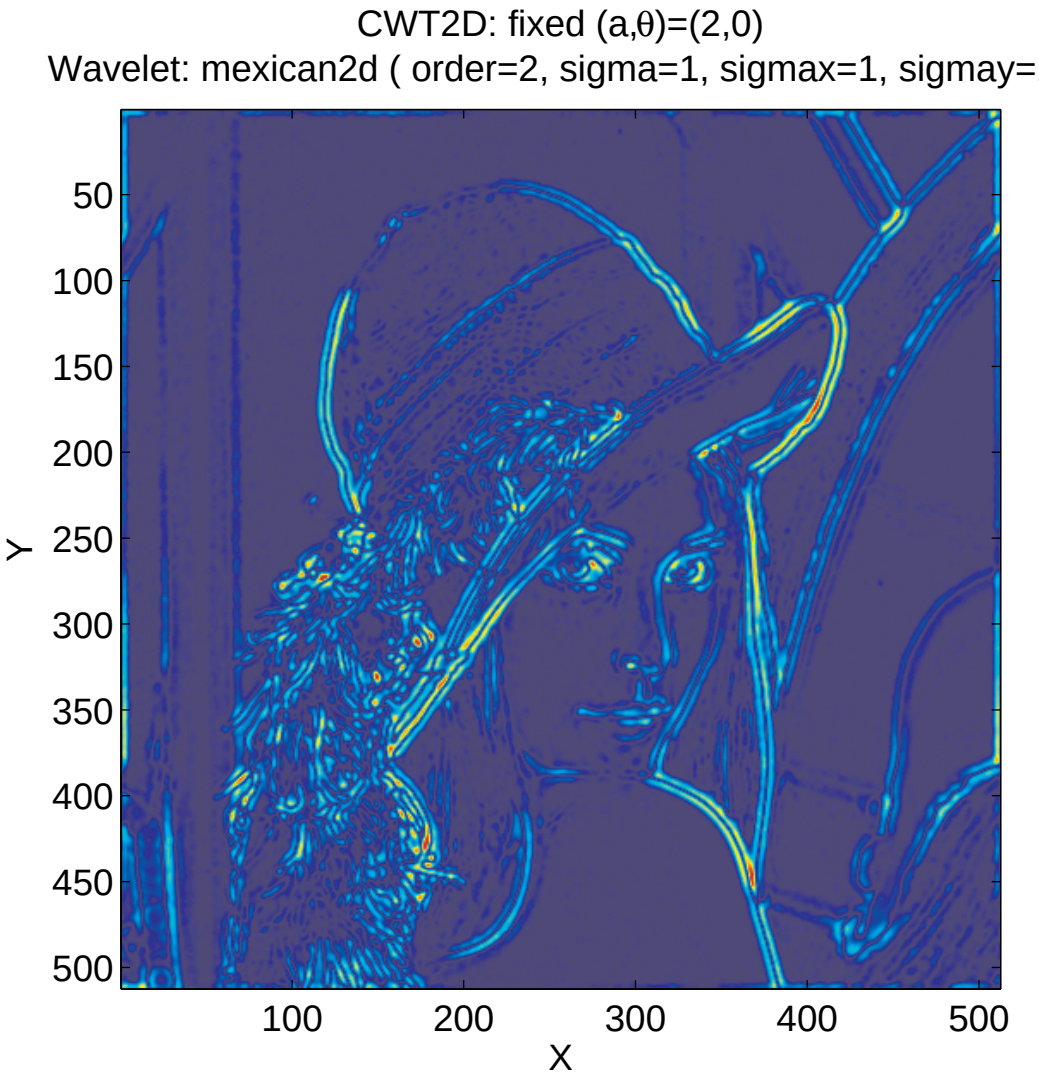

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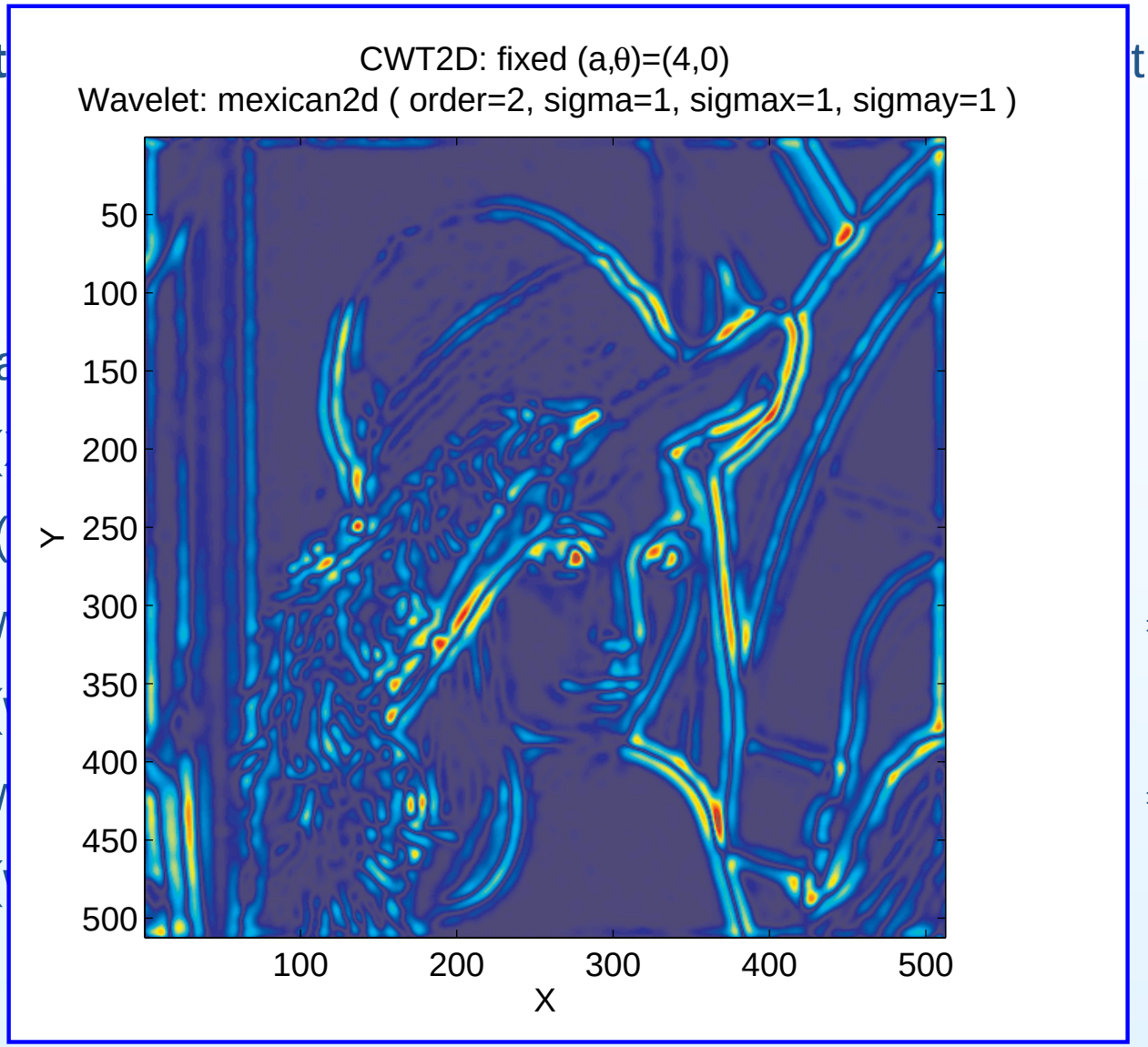

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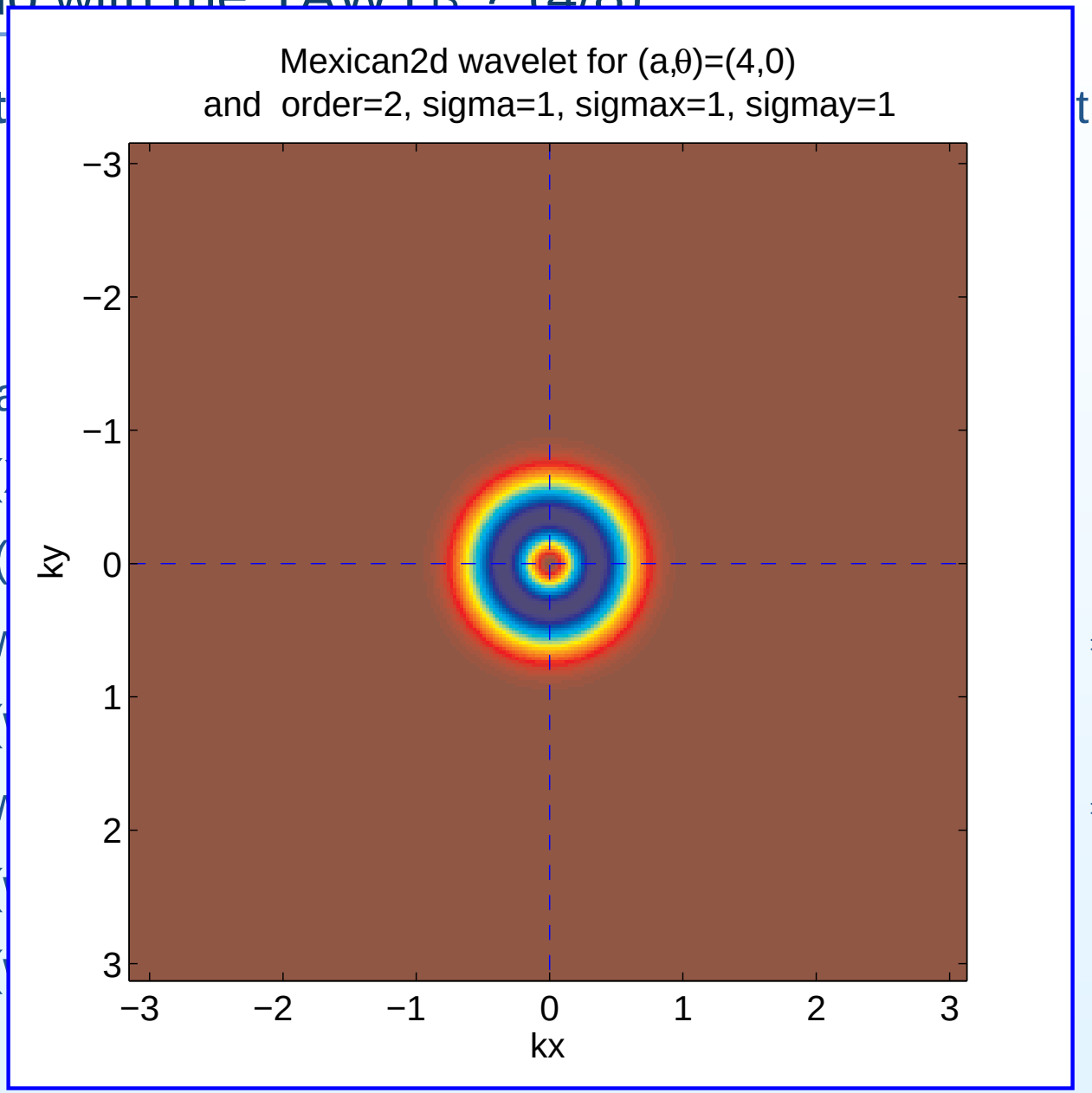

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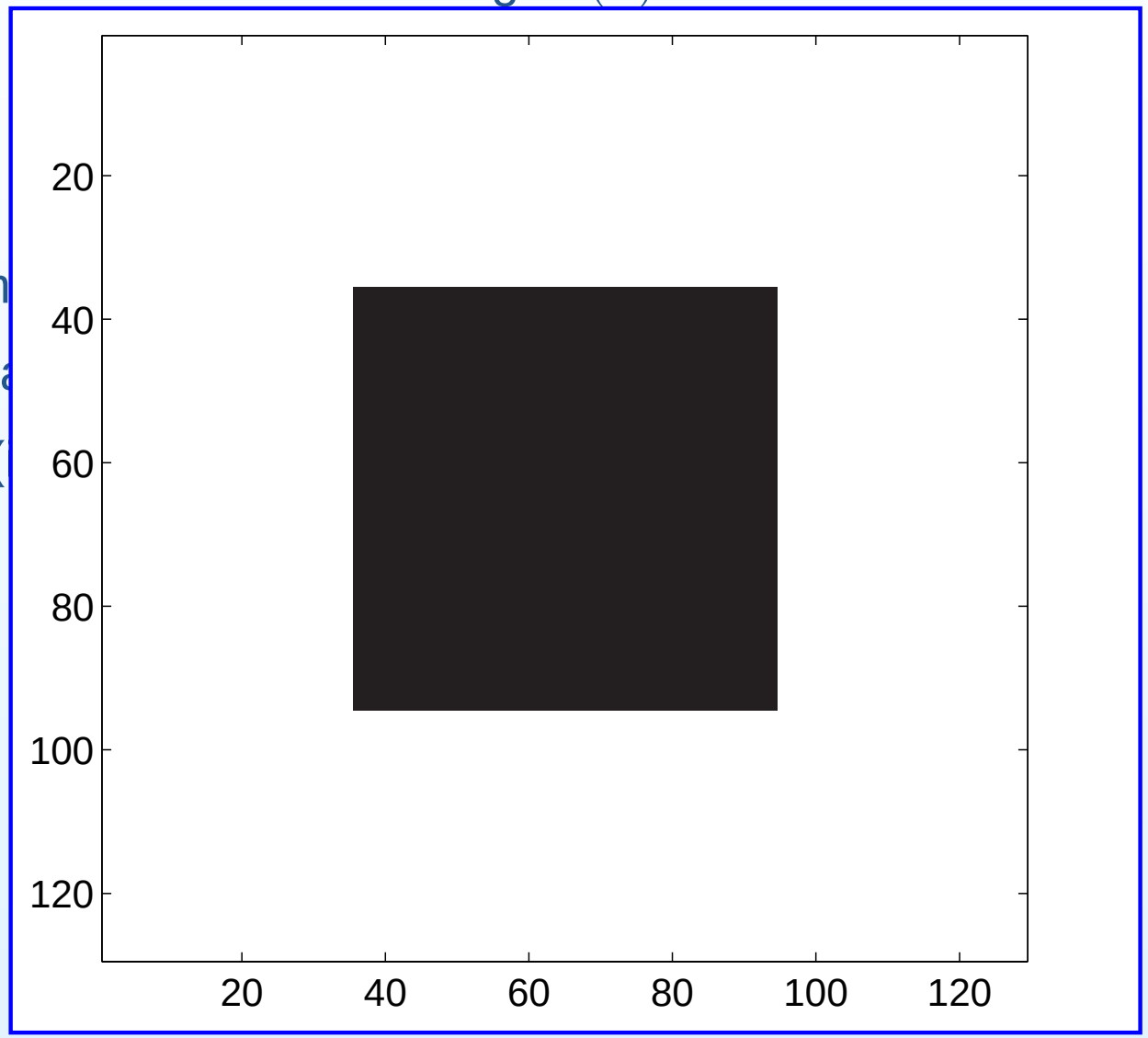

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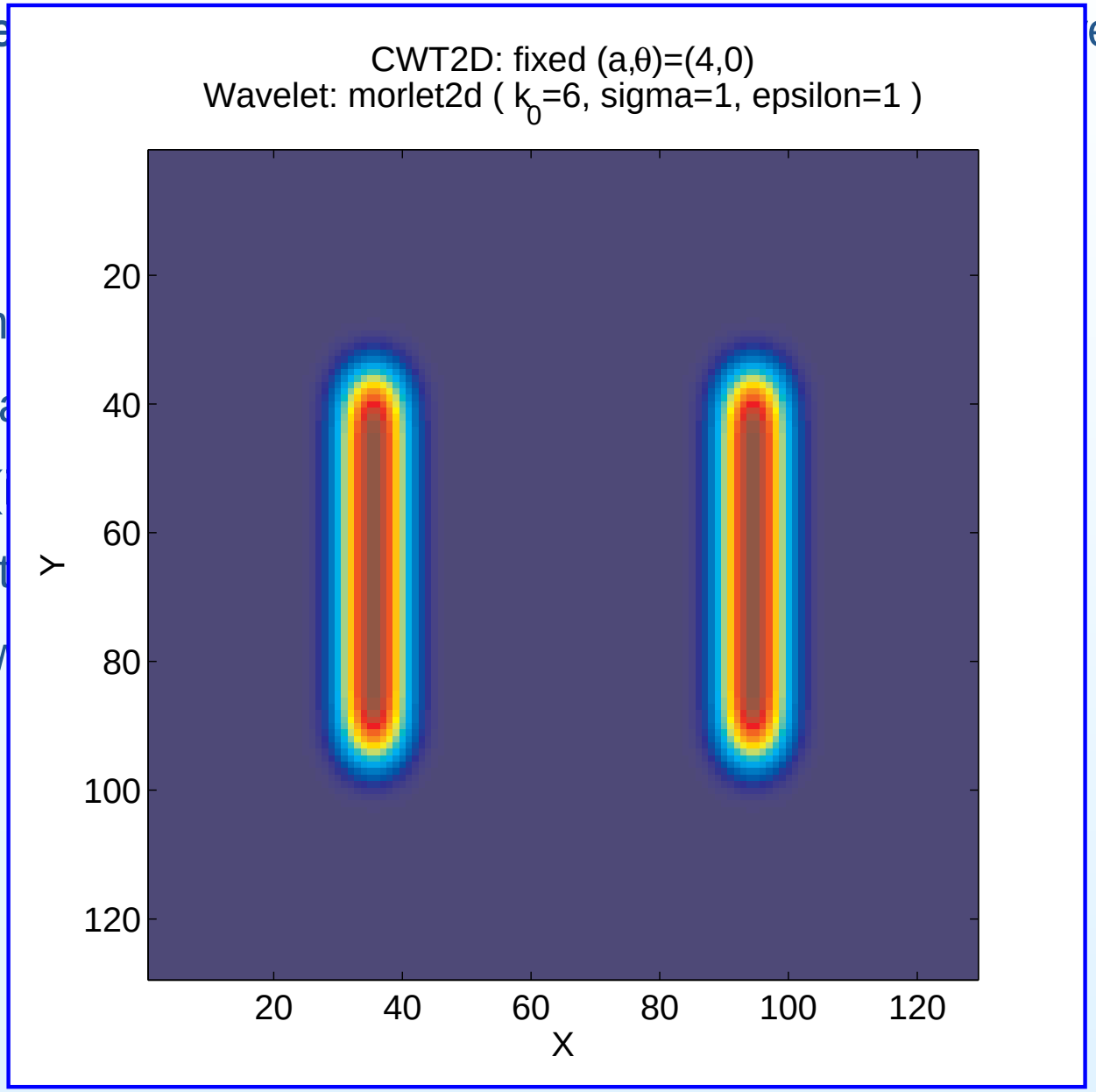

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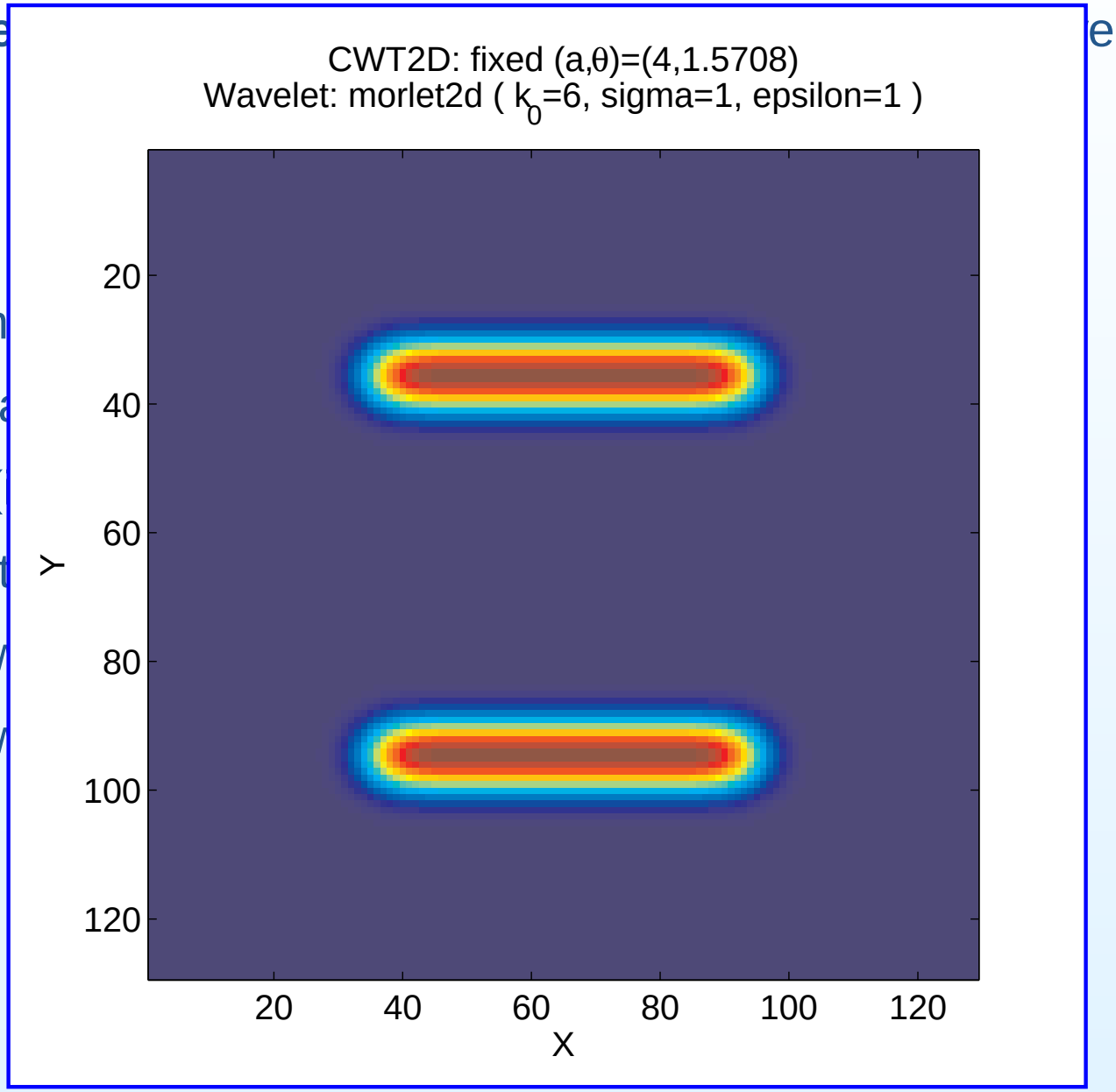

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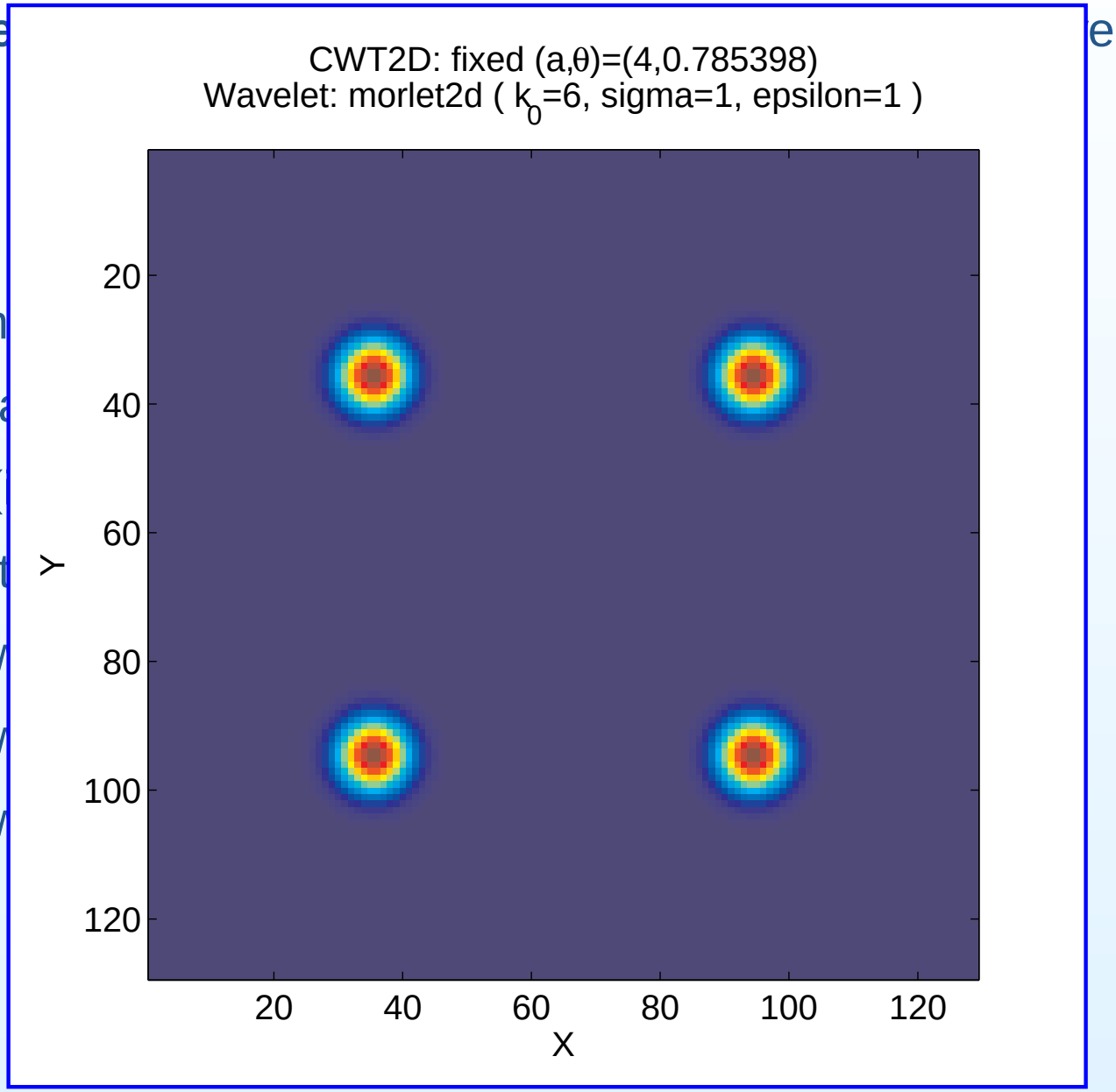

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>> yashow(wav, 'filter');
```

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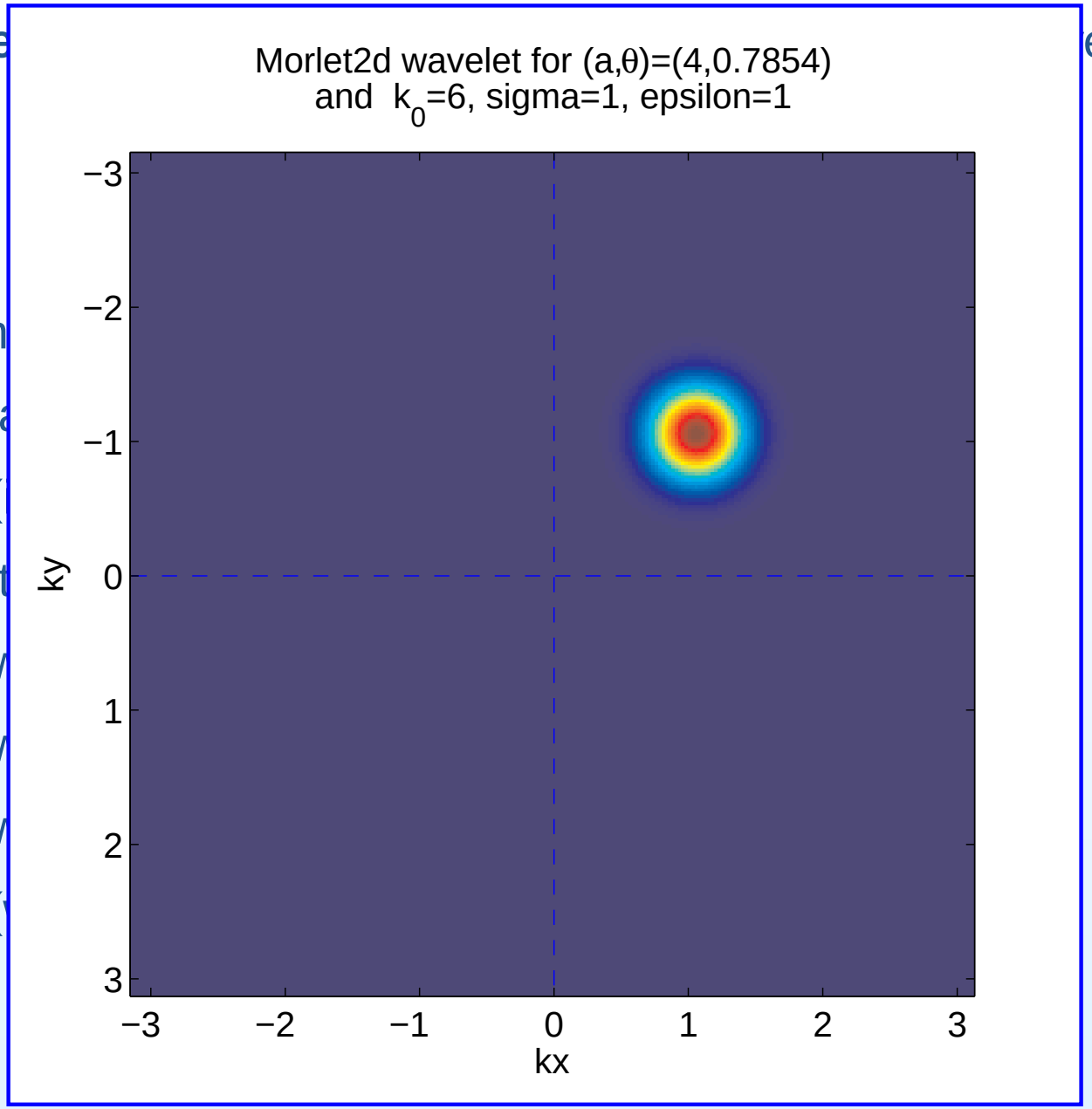

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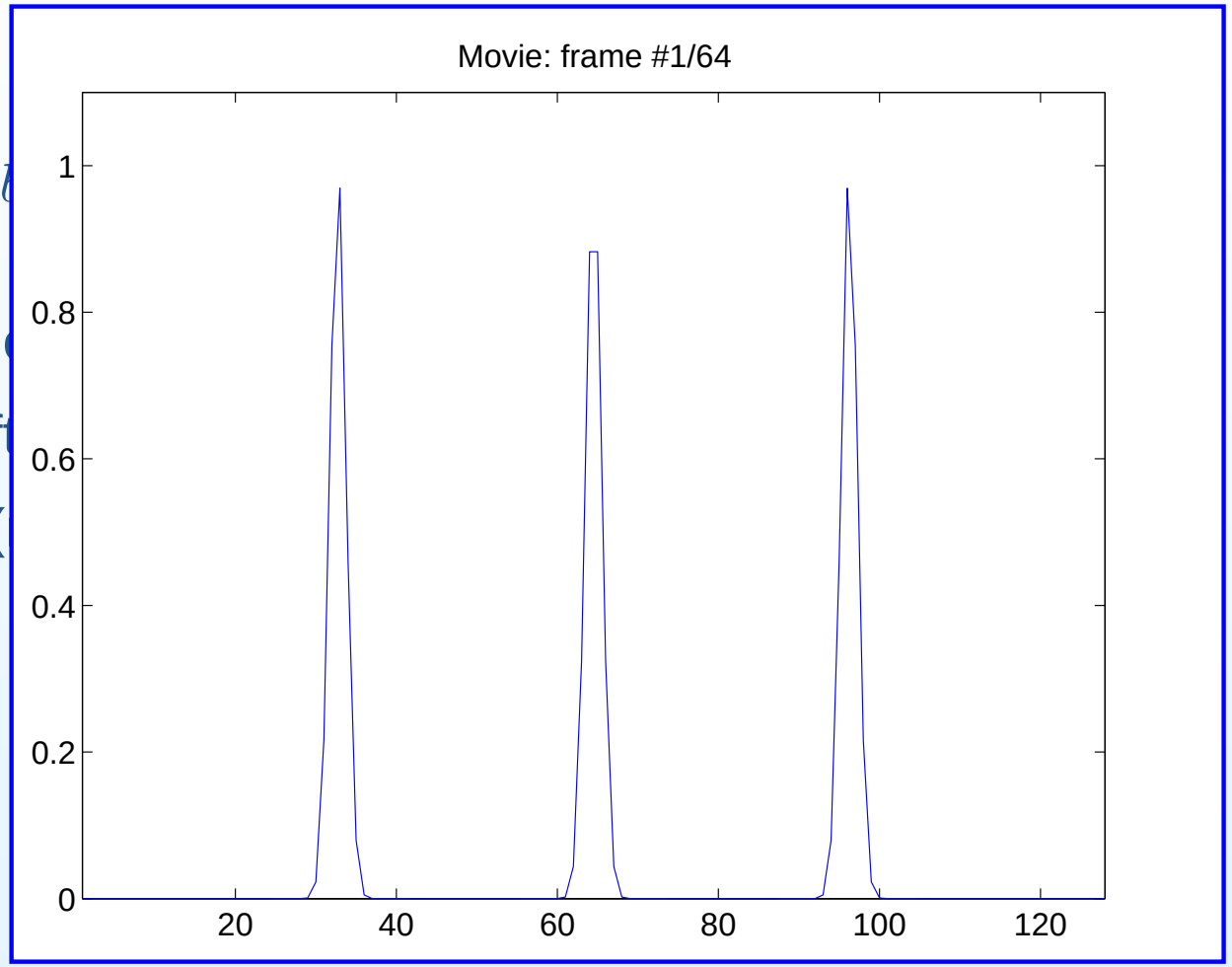

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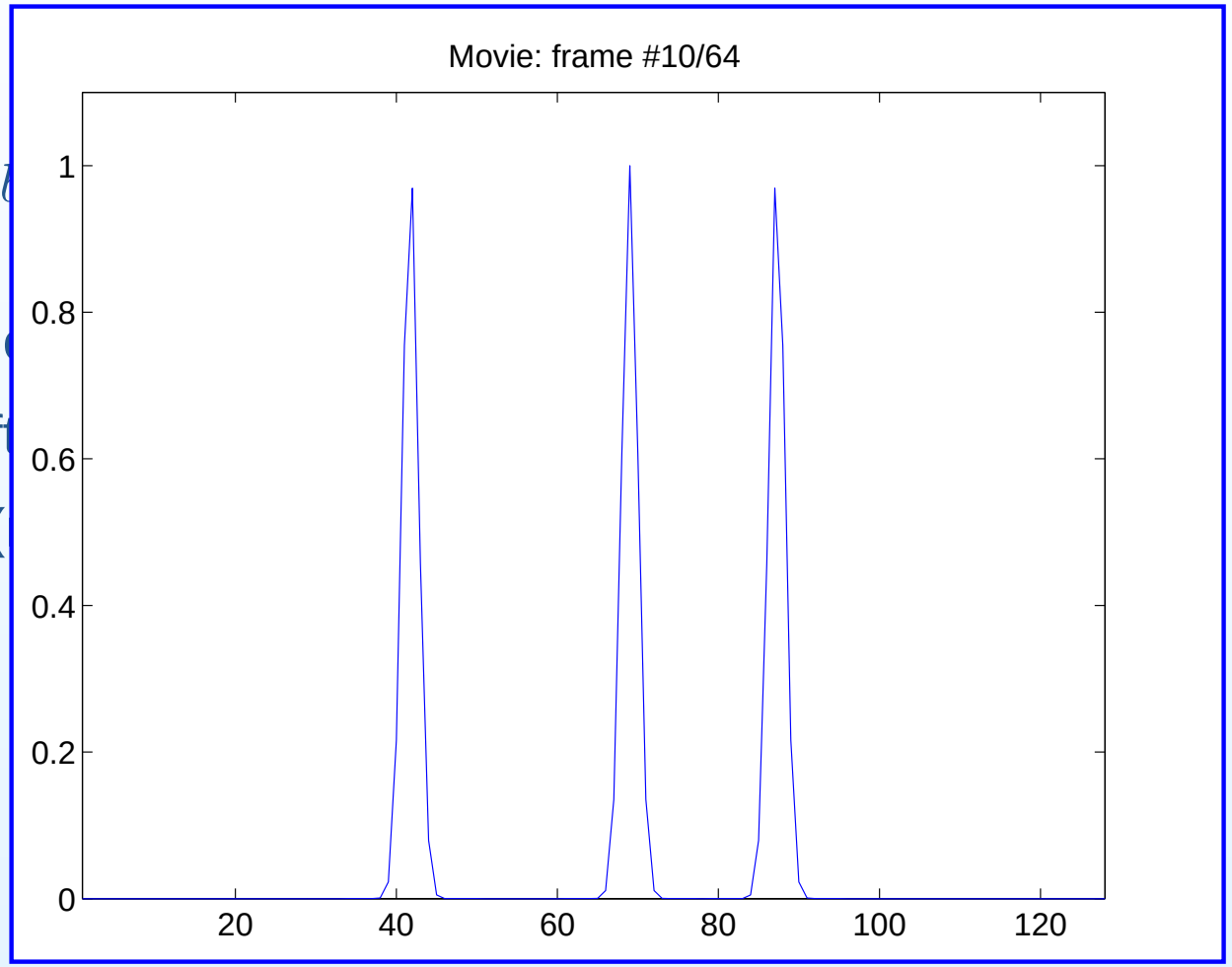

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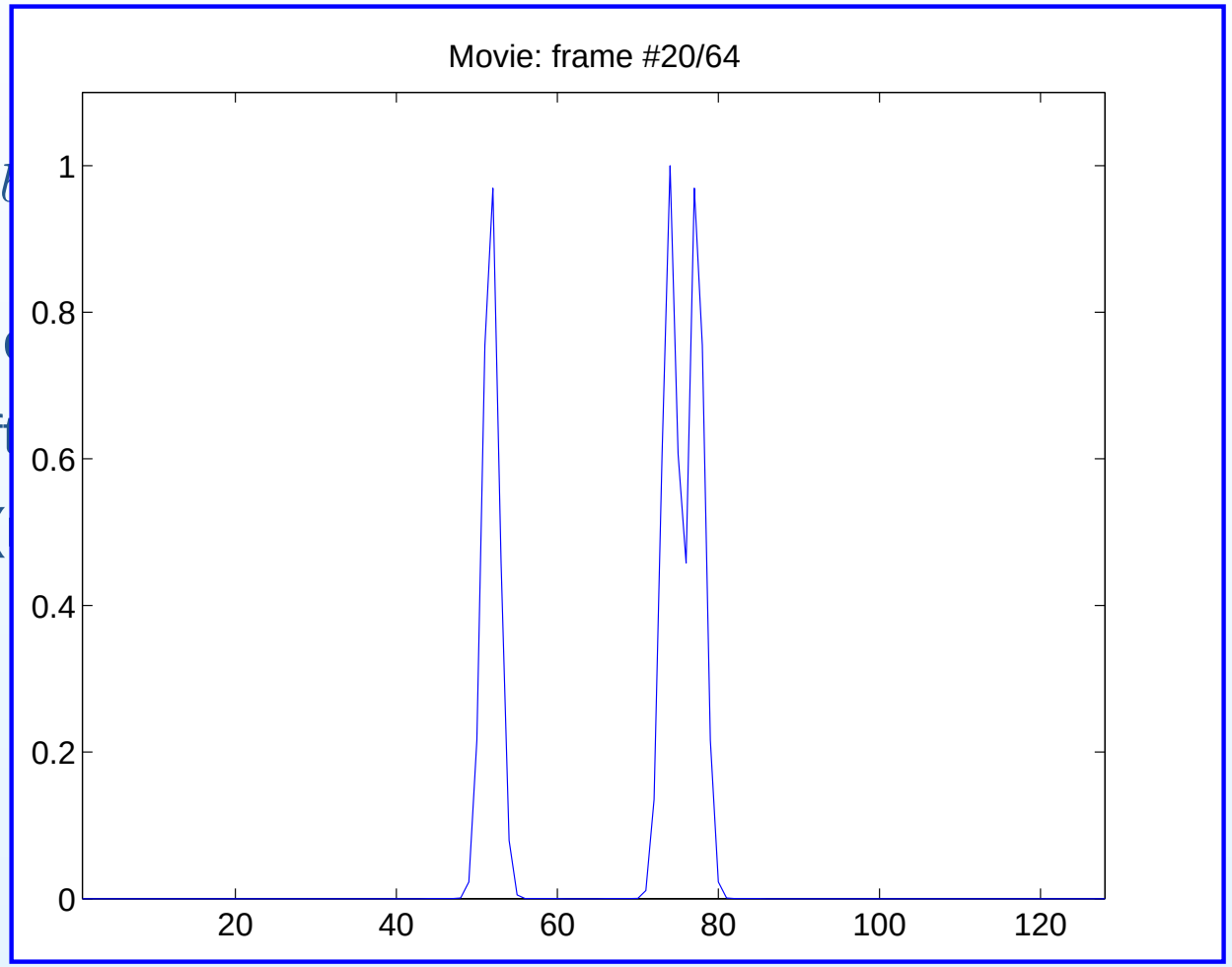

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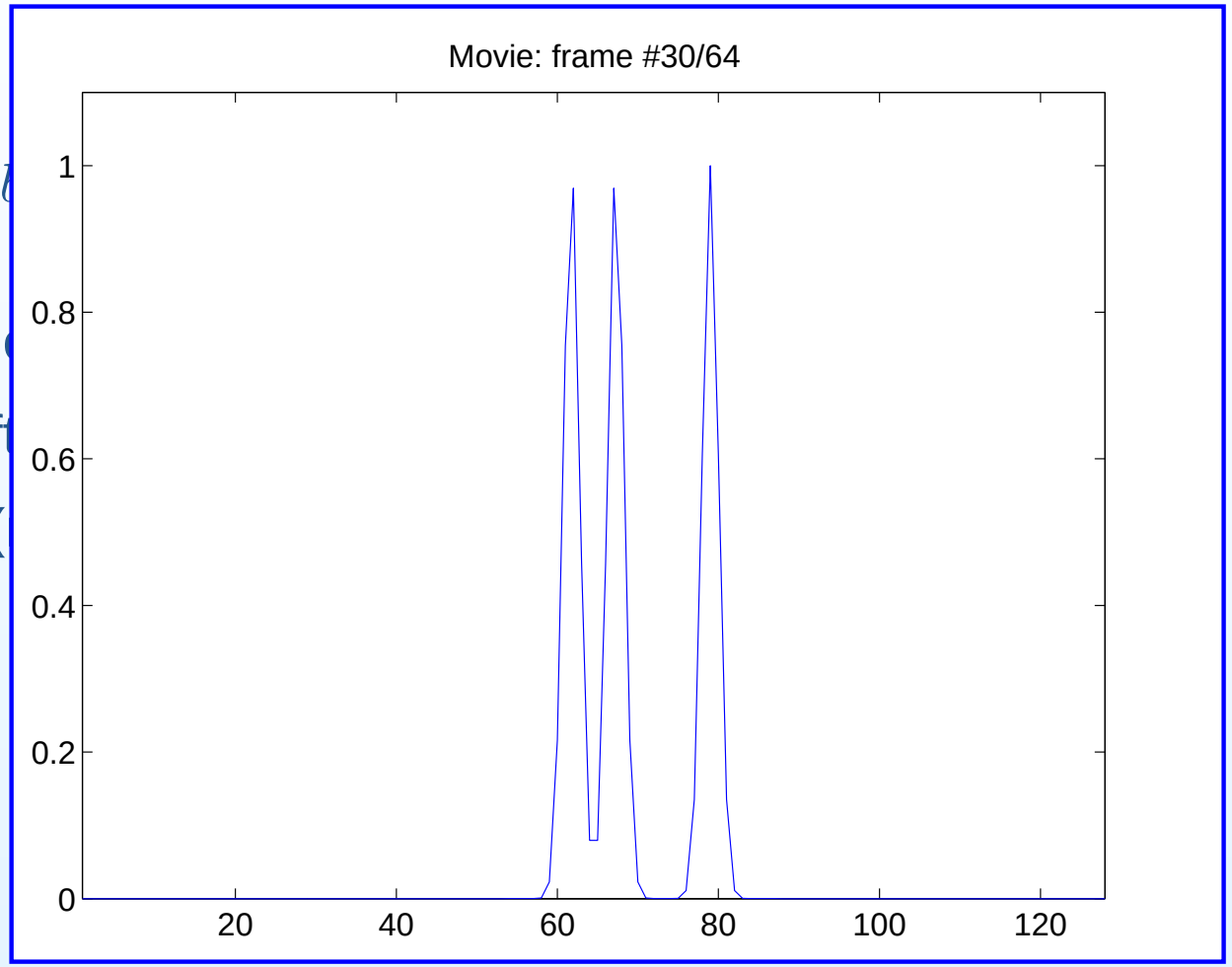

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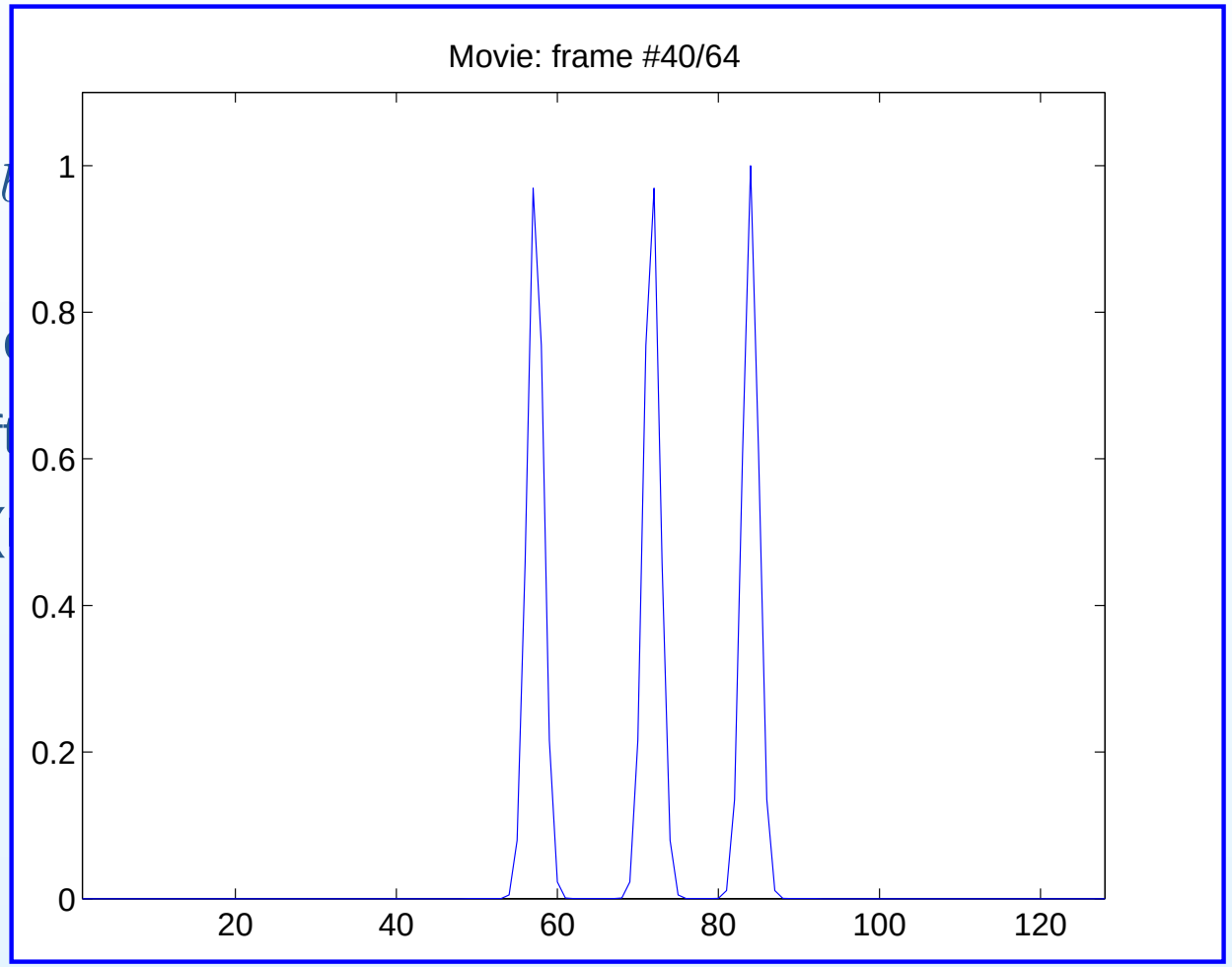

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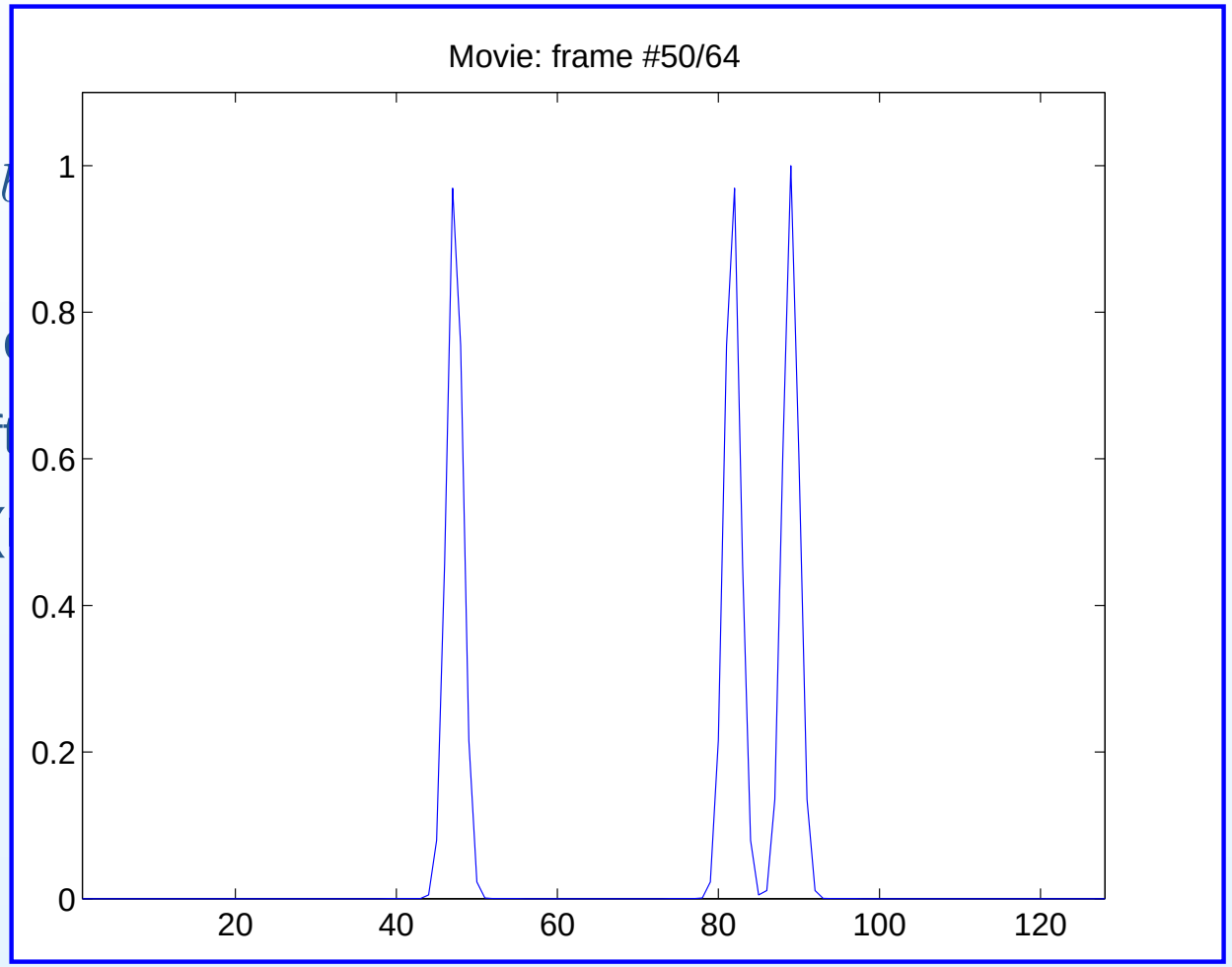

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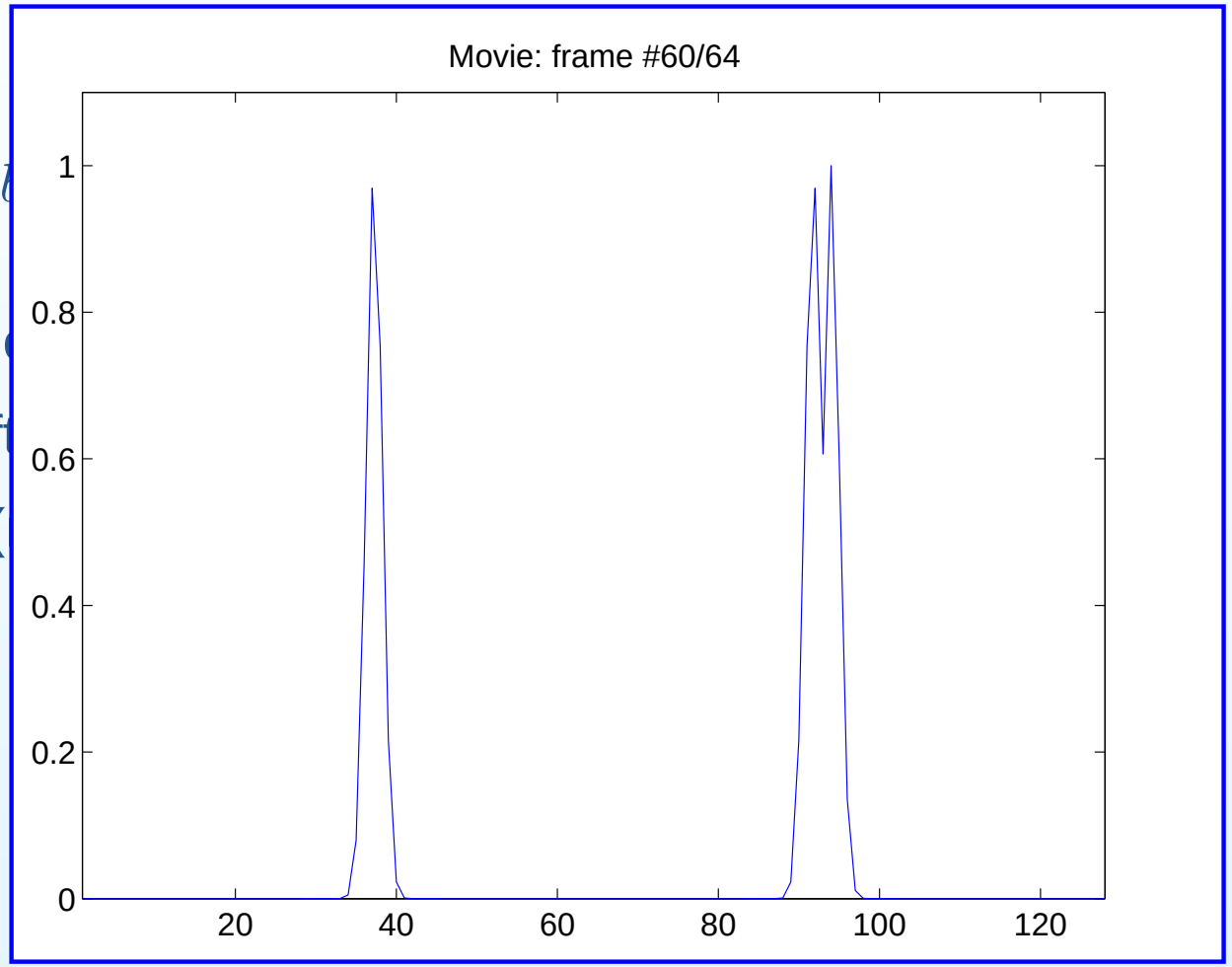

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```
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1D+T CW ... **let**

ψ [DDM93 ...

W ...

```
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>> tmat =
>> yasho
>> c = ve
>> wav =
>> yasho
```

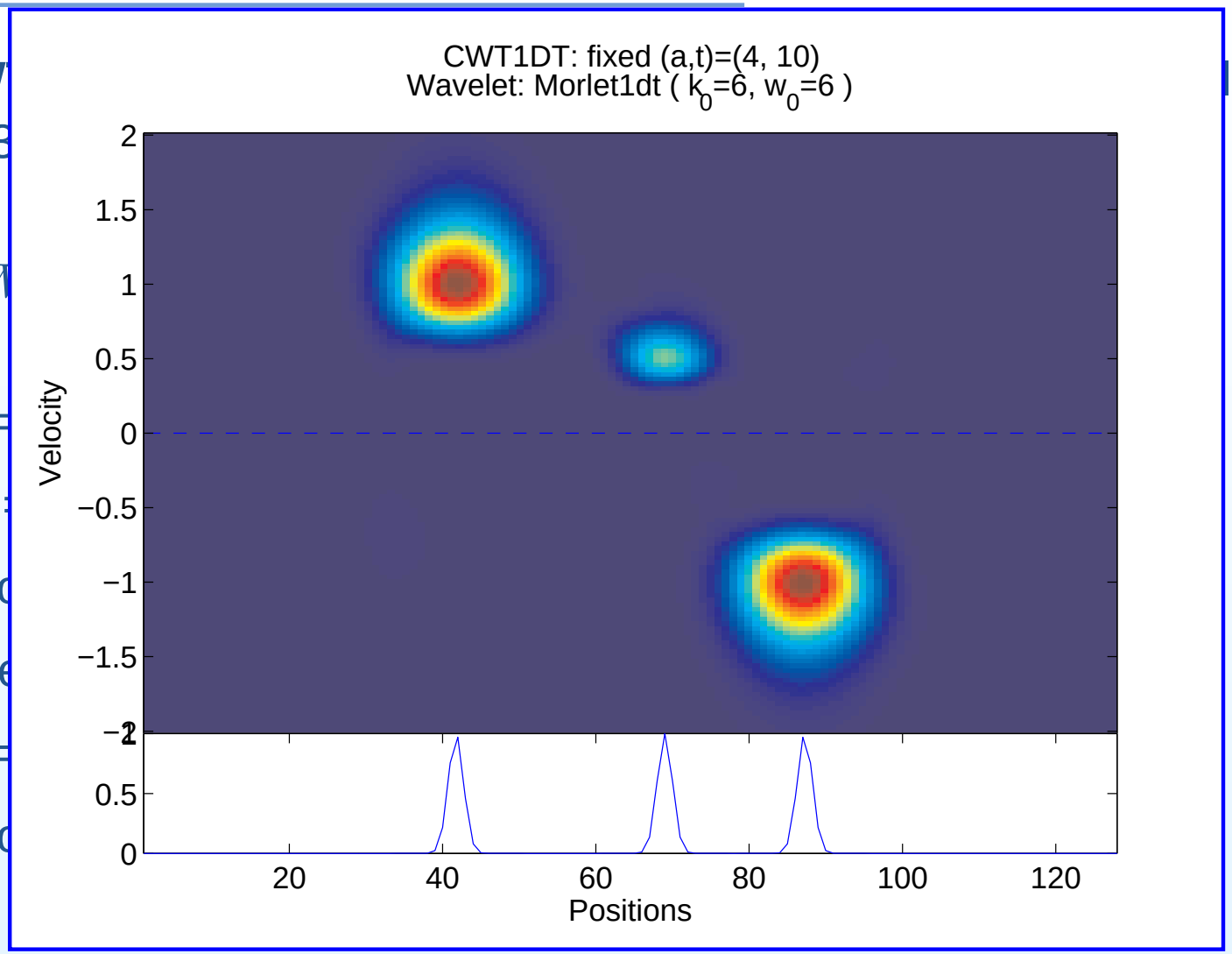

What can you do with the YAWTB ? (7/8)

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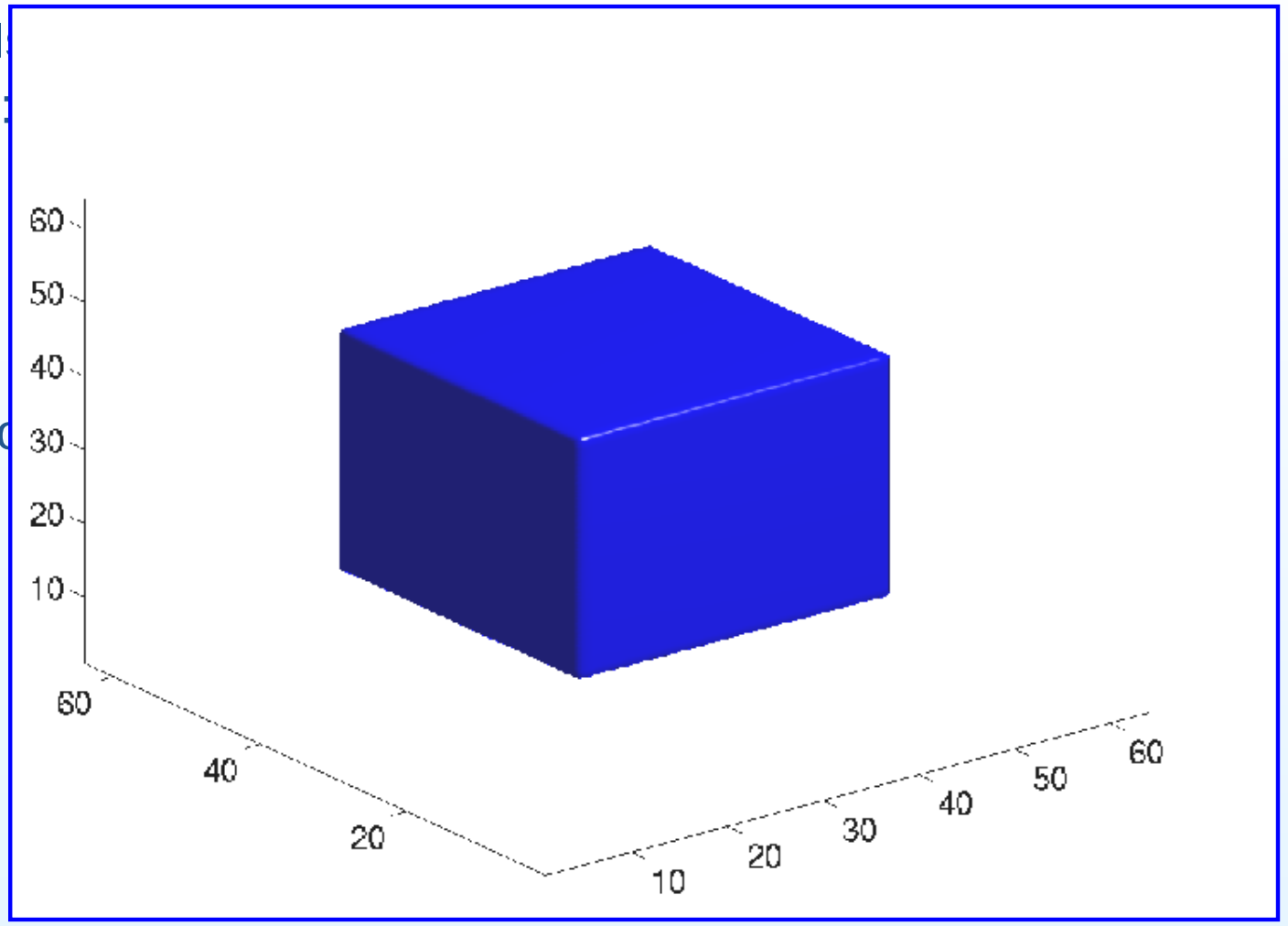
3D CWT I

wavelet ψ:

≫ vol =

≫ yash



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```
>> vol = cube(64);
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>> fvol = fftn(vol); %% Precompute FFT
```

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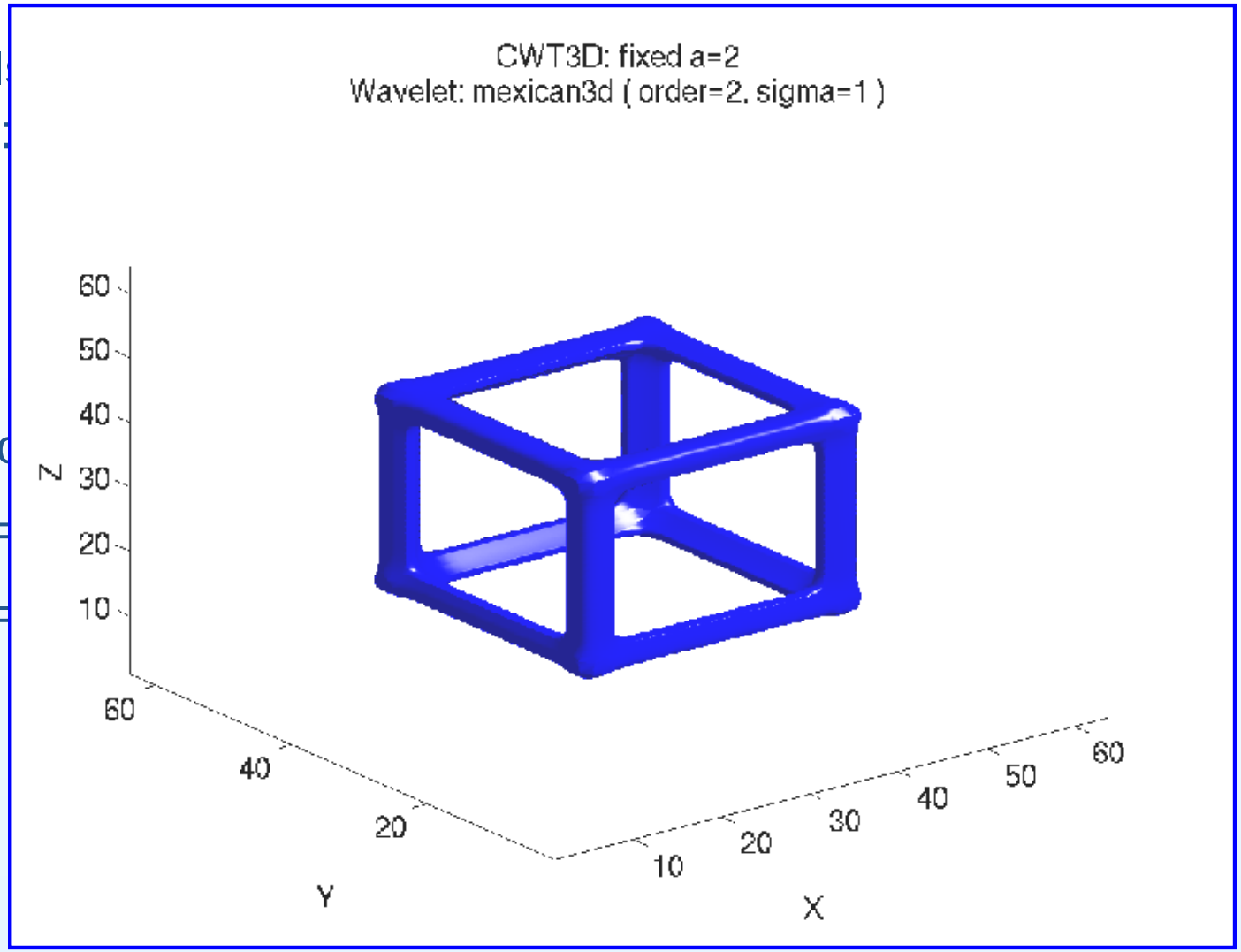

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>> yashow(wav, 'levels', 3) %% Three level sets
```

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```
>> vol =
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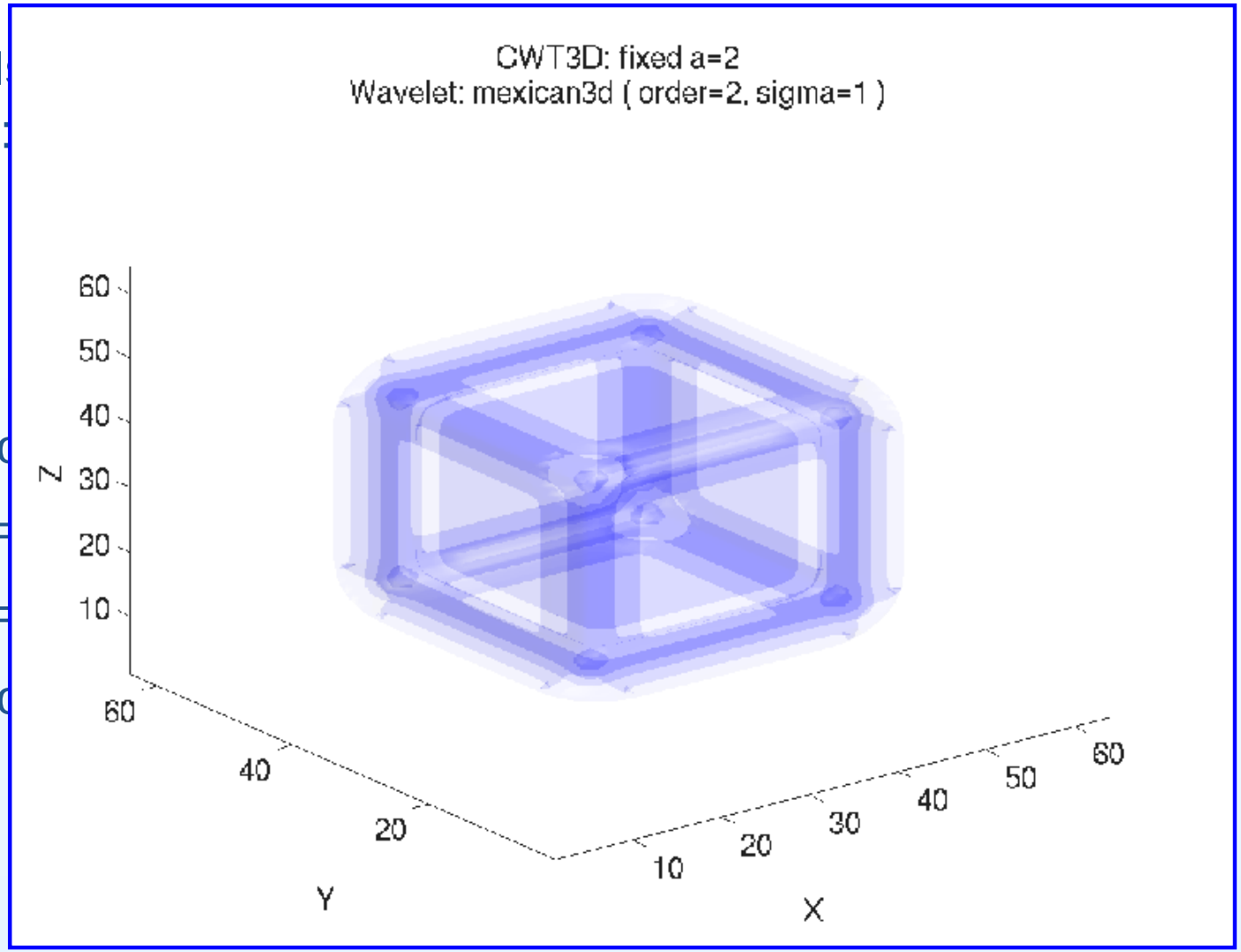

What can you do with the YAWTB ? (8/8)

Spherical CWT Isotropic Given a spherical data $I(\theta, \varphi)$, and a spheric isotropic wavelet ψ:

$$W_f(\theta, \varphi, a) = \int_{S_2} \sin\theta' \, \mathrm{d}\theta' \, \mathrm{d}\varphi' \; I(\theta', \varphi') \, \psi^*_{\theta,\varphi,a}(\theta', \varphi')$$

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Stereographical Dilation

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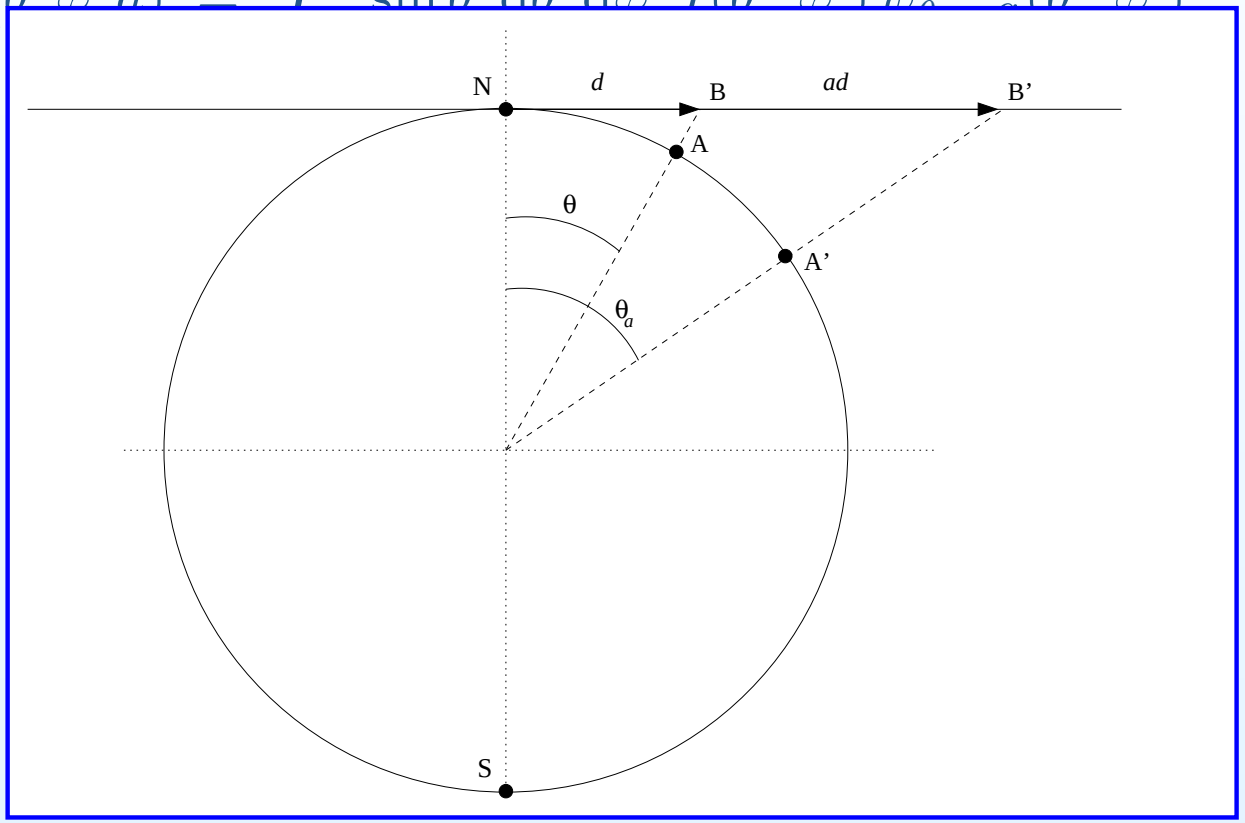

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$\gg$ load world2;

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$\gg$ load world2;

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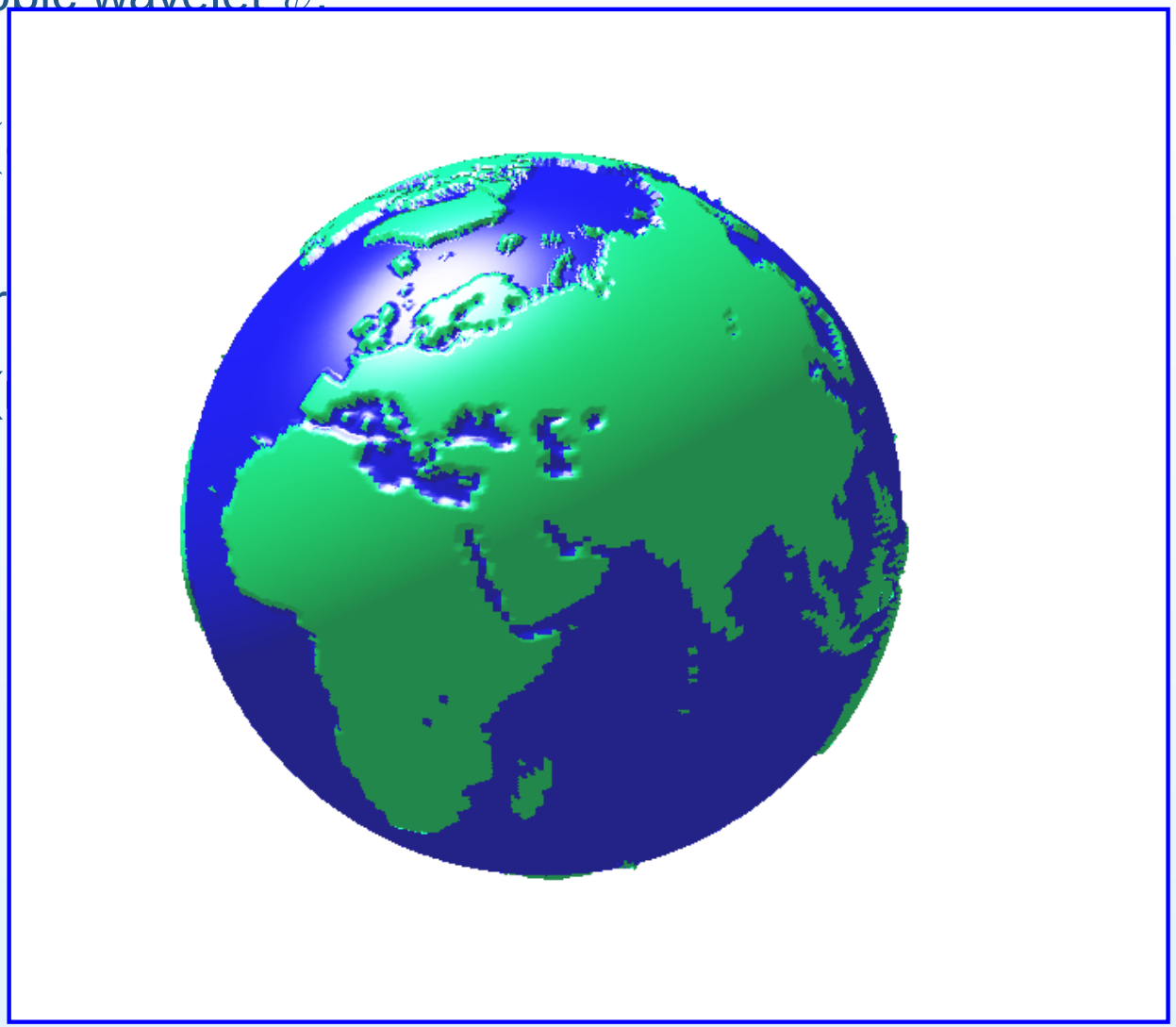
$$W_f($$

≫ load wor

≫ yashow(



What can you do with the YAWTB ? (8/8)

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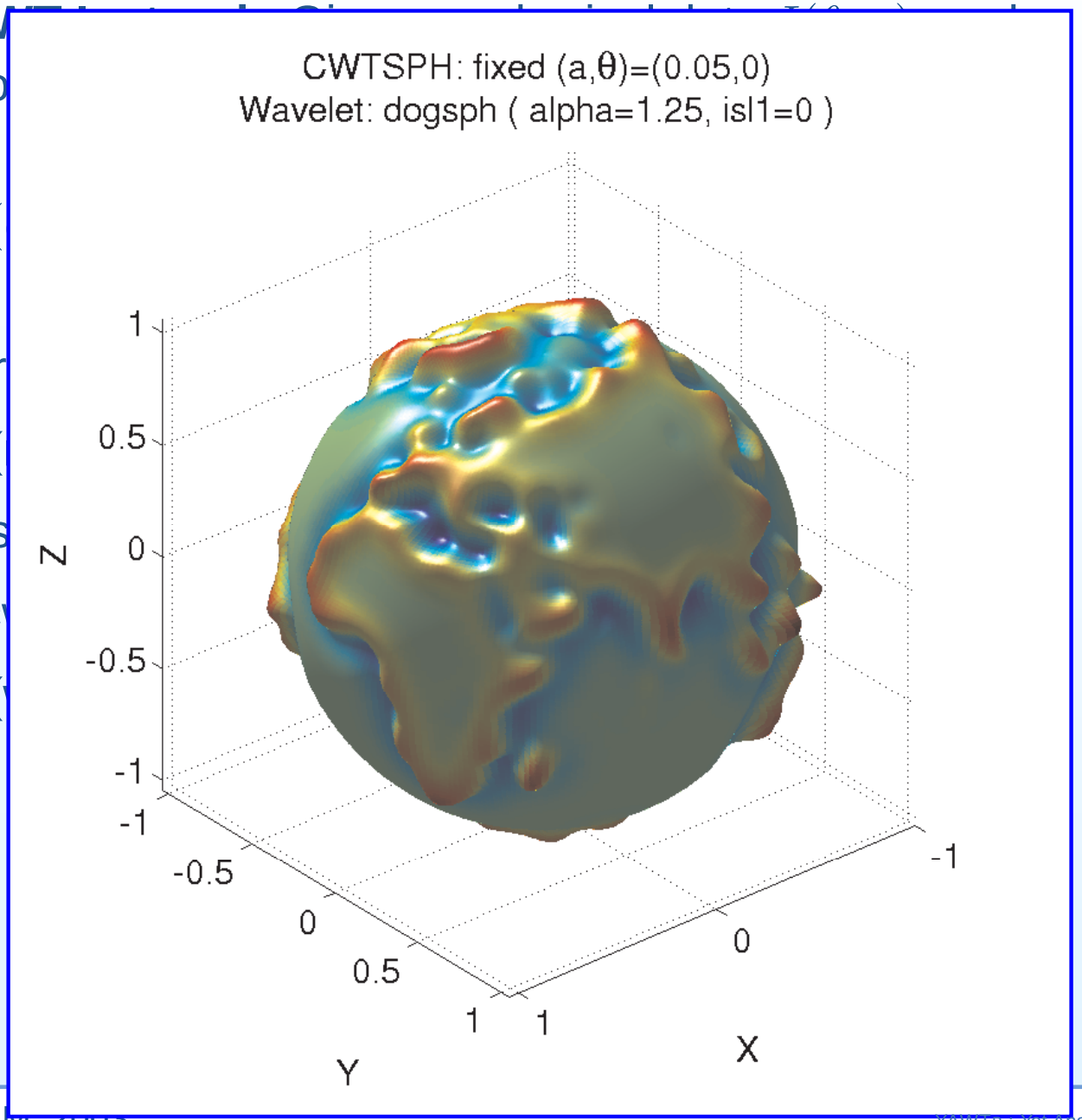

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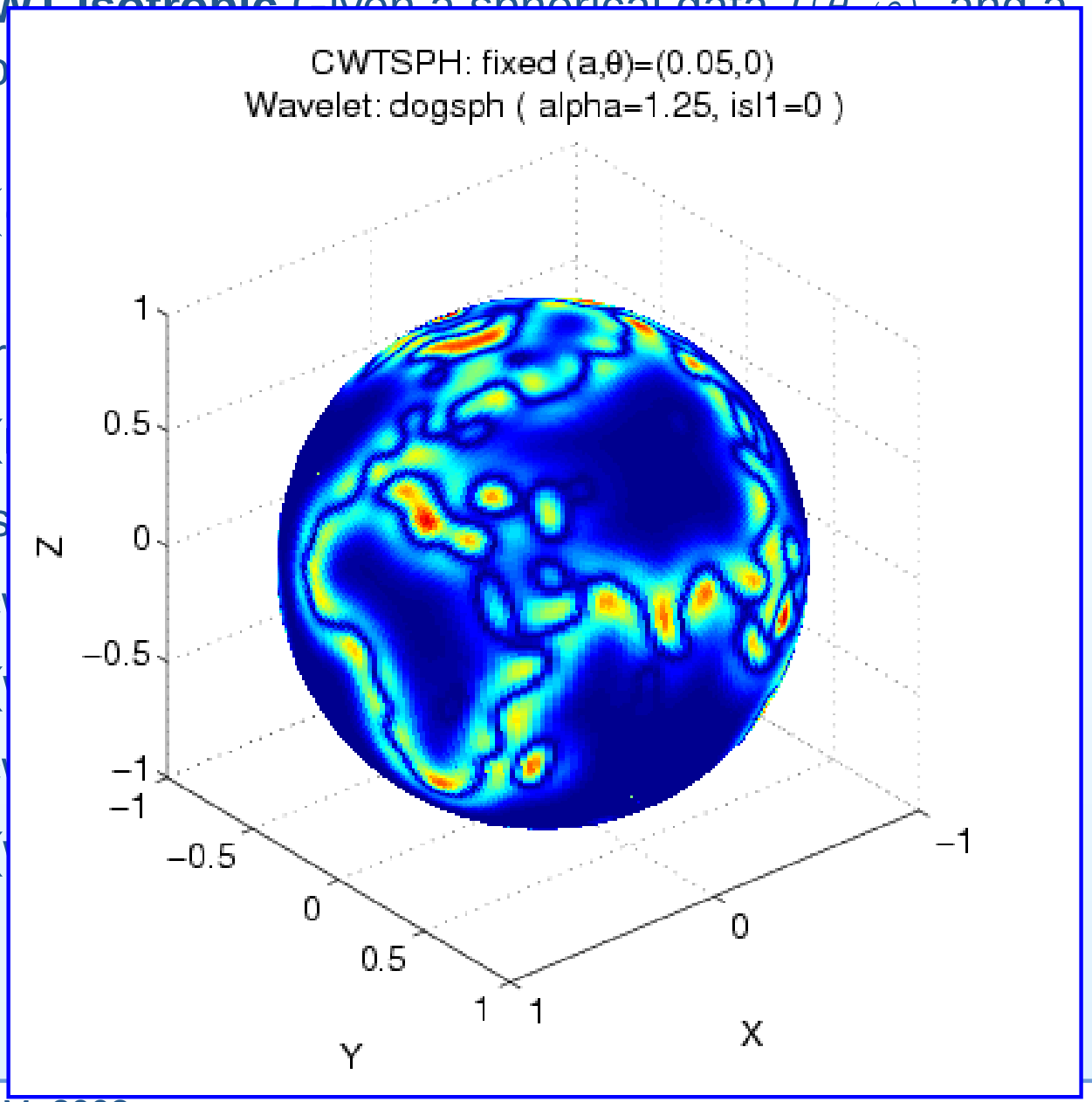

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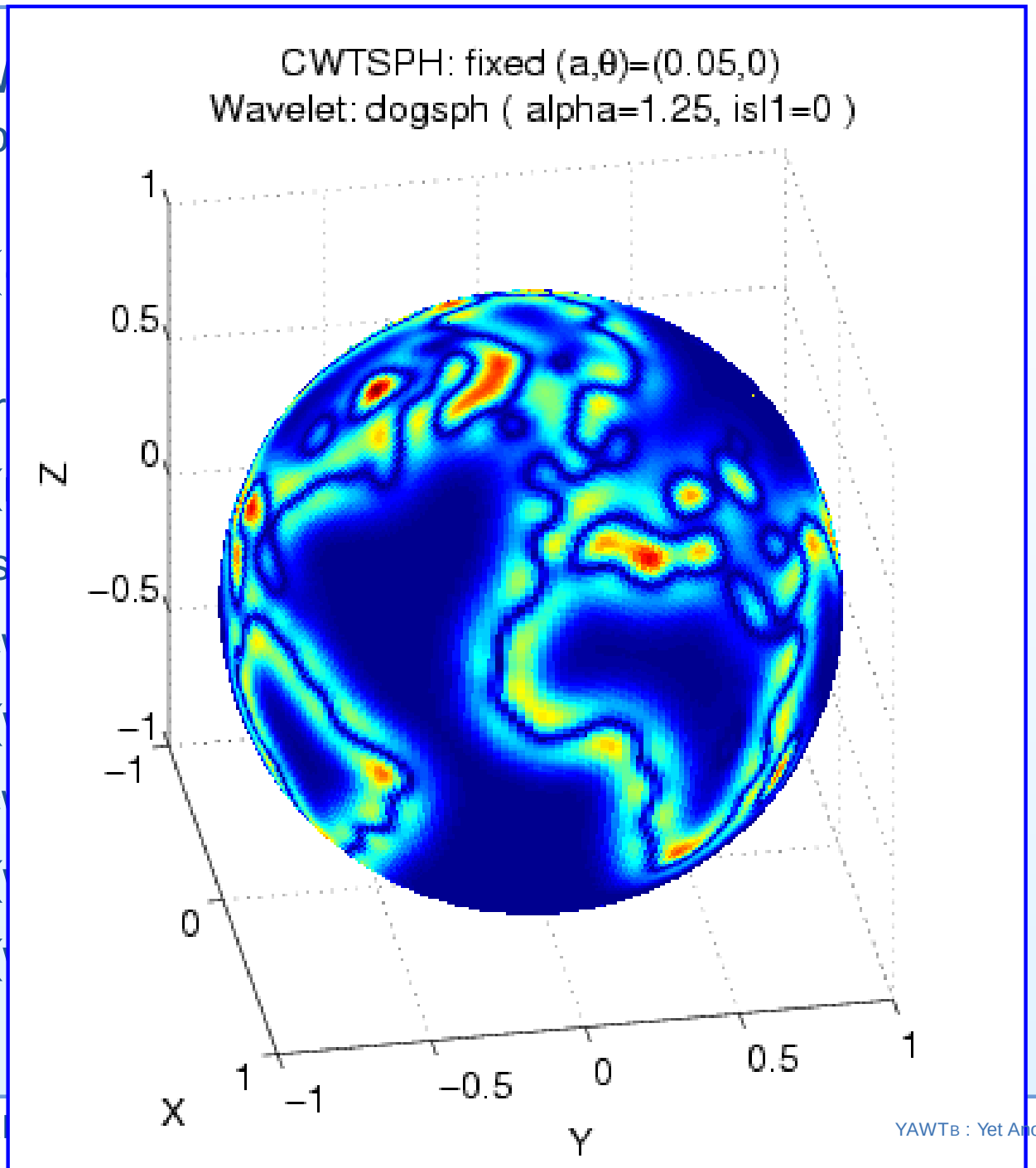

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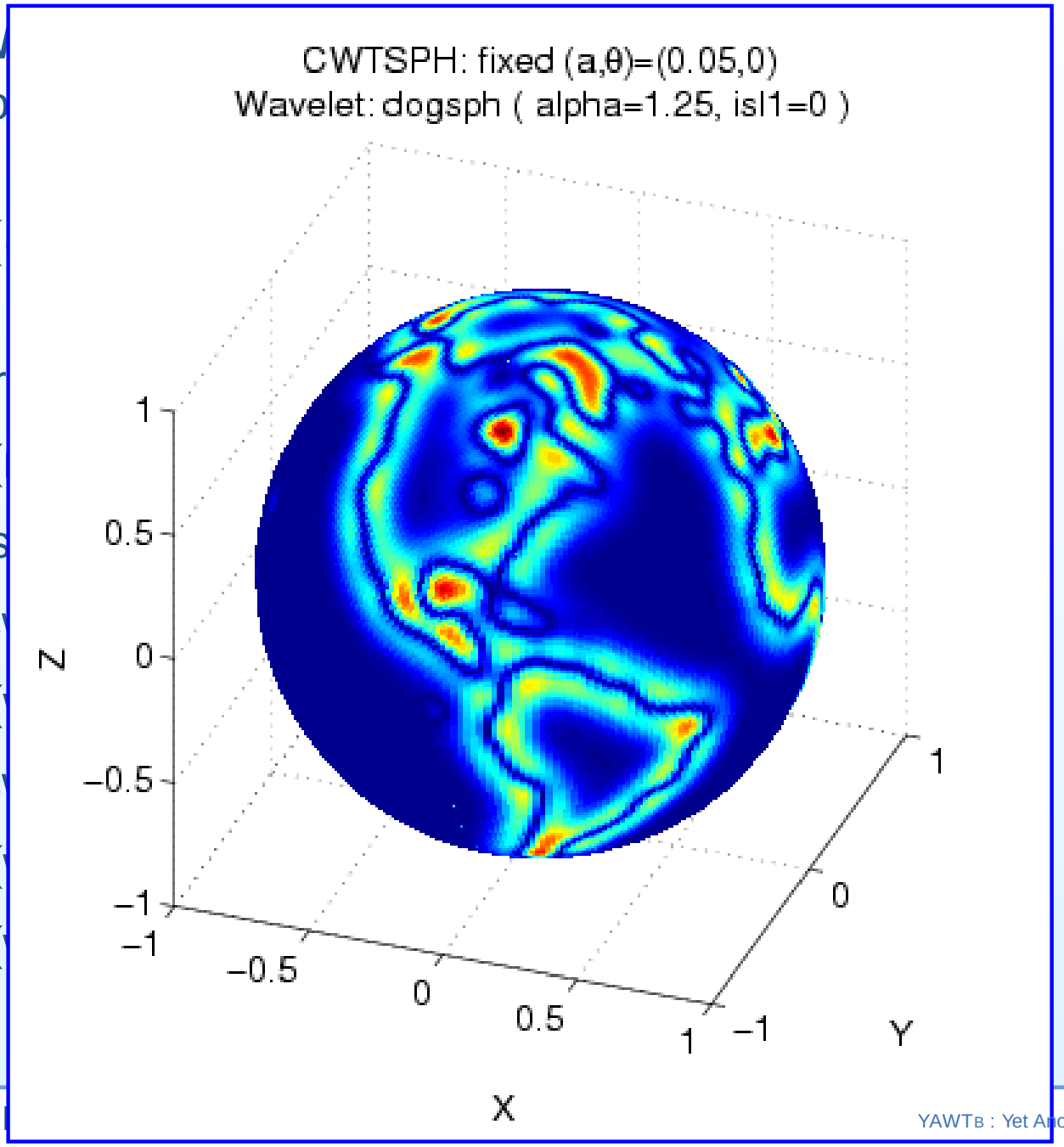

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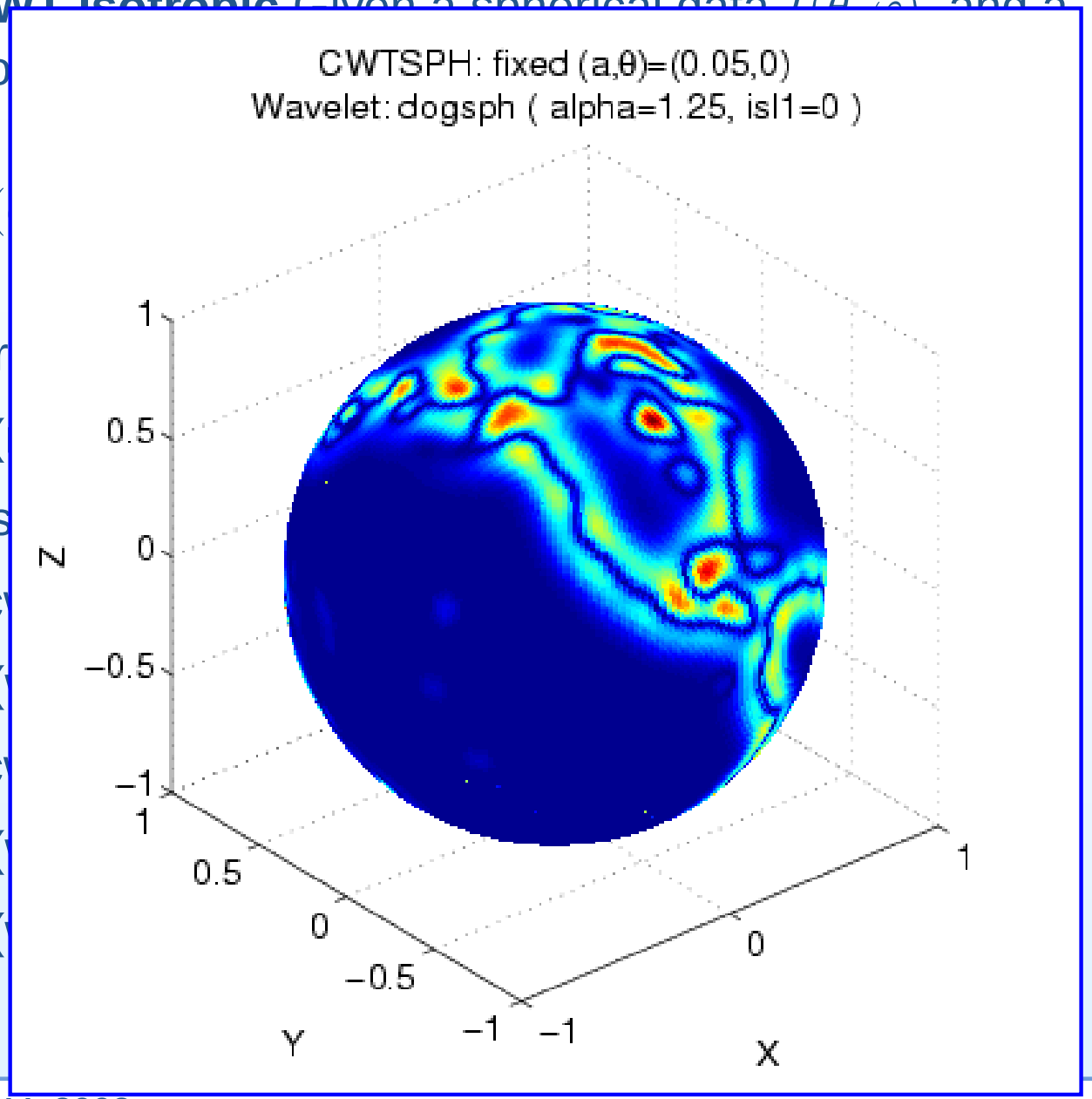

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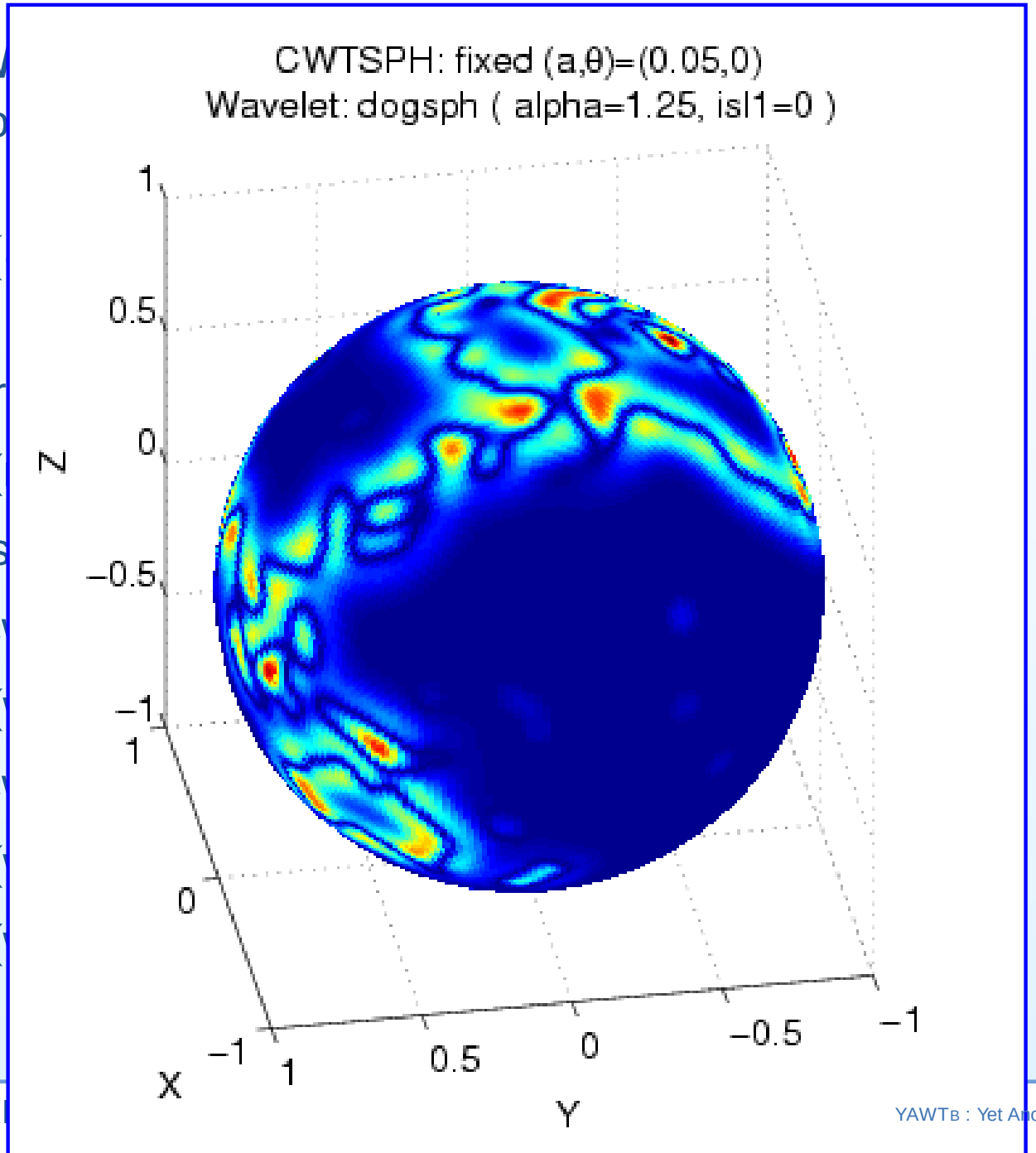

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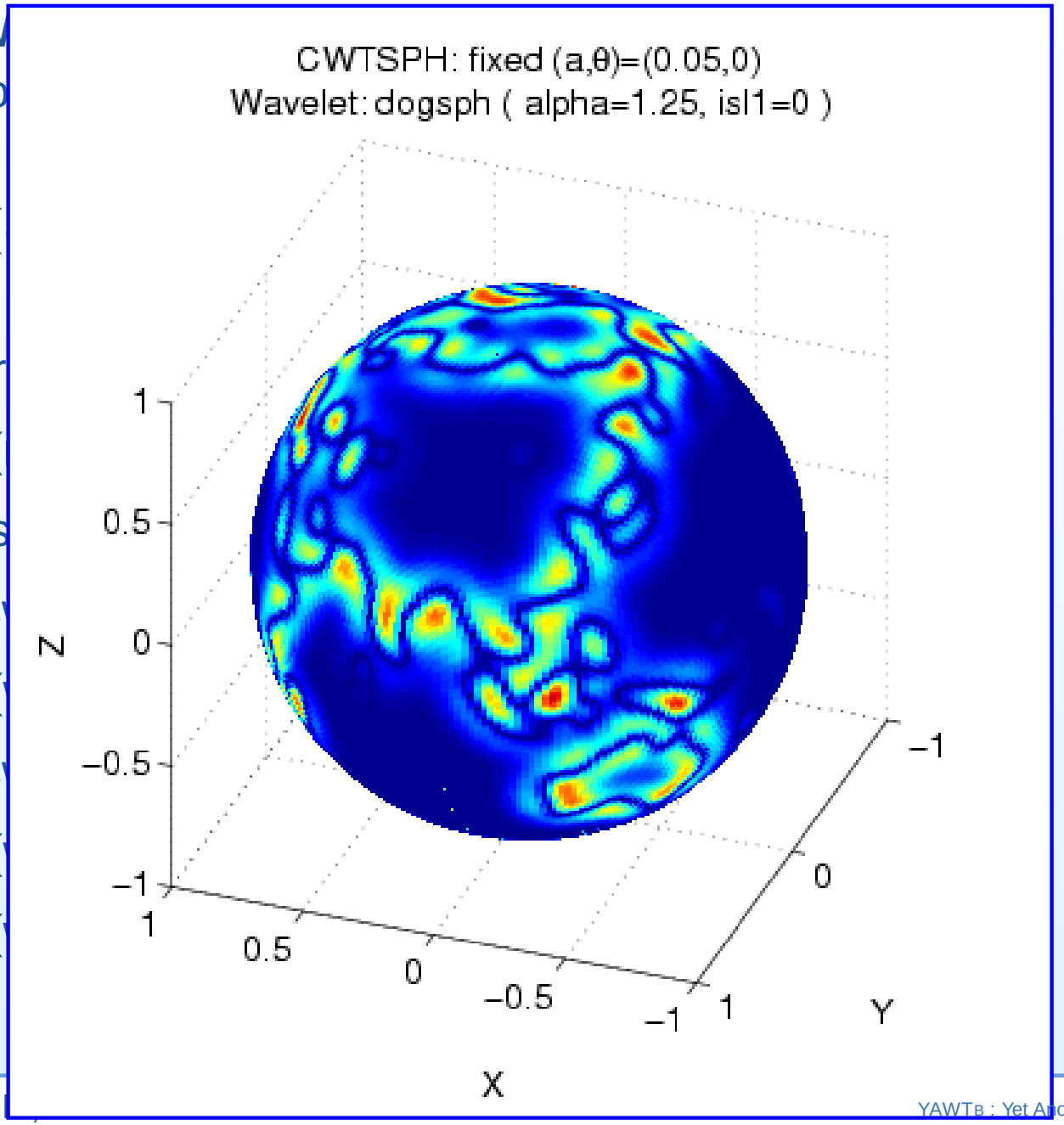

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>> yashow(wav);
>> yashow(wav,'filter','relief');
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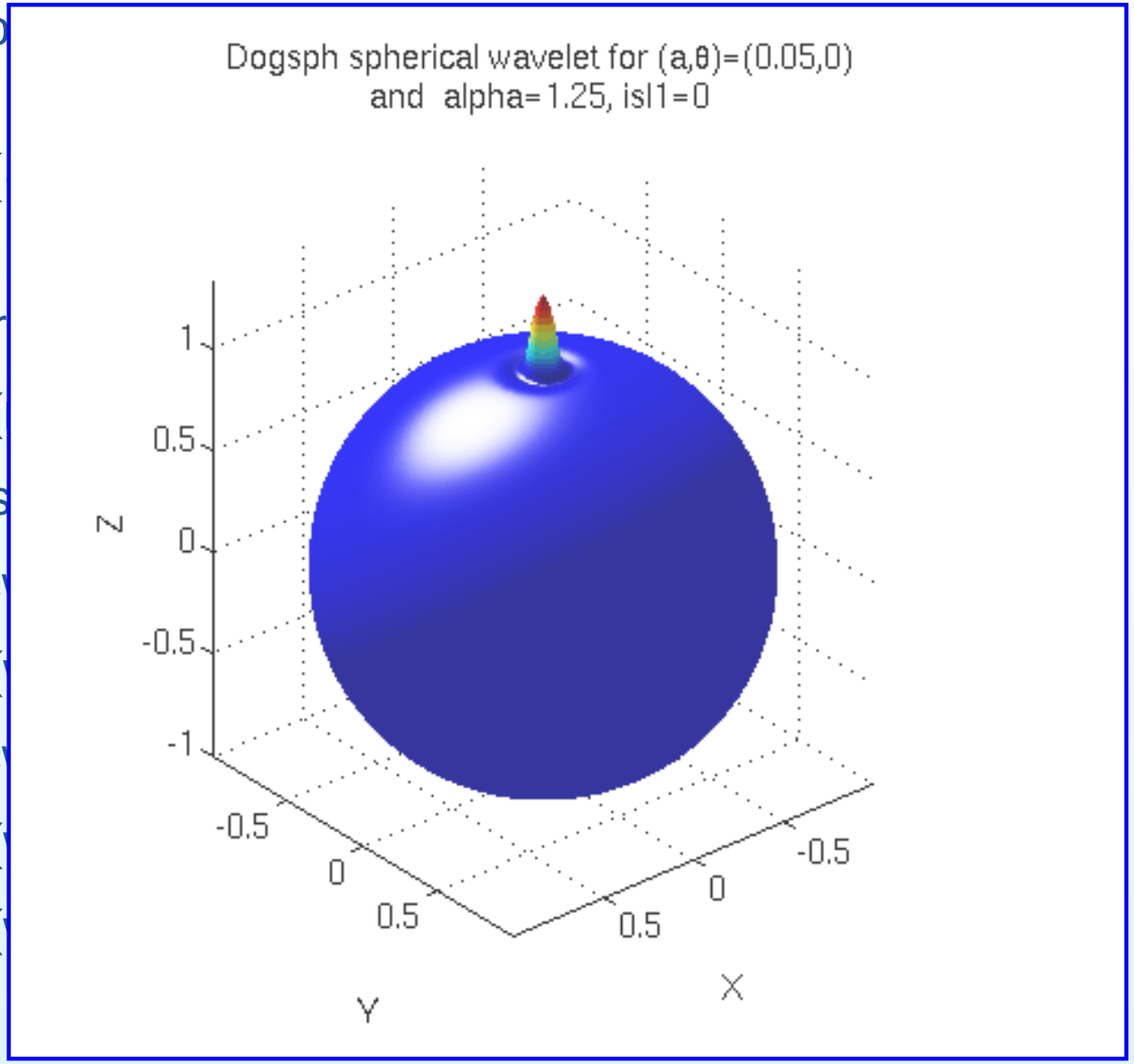

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5. . . . (We’re looking for interested developers ;-)

References

[AMV96] Jean-Pierre Antoine, Romain Murenzi, and Pierre Vandergheynst. Two-dimensional wavelet analysis in image processing. *Int. J. Imag. Syst. Tech*, 7:152–165, 1996.

[AMV99] Jean-Pierre Antoine, Romain Murenzi, and Pierre Vandergheynst. Directional wavelets revisited: Cauchy wavelets and symmetry detection in patterns. *Appl. Comput. Harmon. Anal.*, 6:314–345, 1999.

[CJRV] A. Coron, L. Jacques, A. Rivoldini, and P. Vandergheynst. The YAWtb toolbox (Yet Another Wavelet toolbox). `http://www.fyma.ucl.ac.be/projects/yawtb` .

[DDM93] M. Duval-Destin and R. Murenzi. Spatio-temporal wavelets: Applications to the analysis of moving patterns. *in Progress in Wavelet Analysis and Applications, Y. Meyer and S. Roques, eds., Editions Frontières*, pages 399–408, 1993.

[GPL] GNU General Public License. `http://www.gnu.org/copyleft/gpl.html`.

[SMK] D. Rockmore S. Moore, D. Healy and P. Kostelec. SpharmonicKit is a freely available collection of C programs for doing Legendre and scalar spherical transforms developed at Dartmouth College. It is available at `http://www.cs.dartmouth.edu/~geelong/sphere/`.