

**NAME**

wavetr – 1-D, 2-D and 3-D wavelet transformation

**SYNOPSIS**

**wavetr** [-i] [-1 | -3] [-1 n [-p] [[-a a] [-b b] | [-s] | [-c]]] [-v]  
**inv.wavetr** [-1 | -3] [-1 n [-p] [[-a a] [-b b] | [-s] | [-c]]] [-v]

**DESCRIPTION**

*wavetr* calculates the forward 1-D, 2-D or 3-D wavelet transform based on the Daubechies filter coefficients DAUB2, DAUB4 (default), DAUB6, DAUB8, DAUB12 or DAUB20. For length 4 or 6 related filter coefficients that do not give zero moment(s) can be used also (specify **-a** and/or **-b**). The length is given with the **-1** option. If **-i** is specified (or if *inv.wavetr* is called rather than *wavetr*) the inverse wavelet transform is calculated. If **-1** is specified the 1-D transform is calculated. If the extended variable *depth* is set (and it is greater than one) the 3-D transform is calculated, if not the 2-D transform is calculated. The input sequence must be float and have row, column and if applicable depth dimensions which are powers of 2. *wavetr* does not support multivariate 3-D input. **-v** gives verbose output to *stderr*.

**OPTIONS**

- i** perform inverse wavelet transformation (can be invoked by calling *inv.wavetr* also)
- 1** perform 1-dimensional wavelet transformation
- 3** force *wavetr* to perform 3-dimensional wavelet transformation on multiframe input that does not have the extended header variable *depth* set
- 1 n** use length *n* wavelet filter coefficients (accepted values of *n* are 2, 4, 6, 8, 10, 12 and 20)
- p** (approximately) center "peak" of wavelet rather than "support"
- a a** with length 4 or 6 use (non-zero-moment(s), non-Daubechies) filter coefficients (based on Resnikoff's angle parametrization where *a* is an angle)
- b b** with length 6 use (non-zero-moment(s), non-Daubechies) filter coefficients (based on Resnikoff's angle parametrization where *b* is an angle)
- s** use (non-orthogonal, zero-moment(s)) spline filter coefficients, *n* = 2 gives linear spline, *n* = 4 gives quadratic spline, and *n* = 6 gives cubic spline; experimental option
- c** use Coifman wavelet filter coefficients (coiflets), with length 4, 6, 8, 10 or 12; experimental option
- v** verbose output to *stderr*

**SEE ALSO**

fourtr(1), inv.fourtr(1)

**REFERENCES**

- C.S. Burrus, R.A. Gopinath and H. Guo (1998). *Introduction to Wavelets and Wavelet Transforms: A Primer*. Prentice-Hall.
- I. Daubechies (1988). Orthonormal Bases of Compactly Supported Wavelets. *Communications on Pure and Applied Mathematics*, **41**, 909-996.
- I. Daubechies (1992). *Ten Lectures on Wavelets*. SIAM.
- N. Gershenfeld (1999). *The Nature of Mathematical Modeling*. Cambridge University Press.
- W.H. Press, S.A. Teukolsky, W.T. Vetterling and B.P. Flannery (1992). *Numerical Recipes in C: The Art of Scientific Computing*. Second Edition. Cambridge University Press.

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