# Wavelet Library for Modelica

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A wavelet [1] library has been a standard component in many simulation programs. However, it has not yet been included in Modelica. So far some work has been reported to solve different problems combing Modelica simulation and wavelet calculation [2][3]. This showed the requirement of the wavelet analysis within Modelica. To fill the blank, a comprehensive wavelet library has been developed for Modelica. The preliminary version of this library had already been reported in 2012 and tested with a practical problem [4].

This library includes fifteen commonly used wavelet families. It can carry out continuous wavelet transform, forward and inverse discrete wavelet transforms, and multi-level decomposition and reconstruction in one-dimensional space.

In addition, special application tools for multi-resolution analysis and wavelet denoising are provided in this library, as well. Some examples are programmed to provide the users a quick start to build up their own algorithms. Nevertheless, the library is also well documented with three help files, a User's Guide, a Library References and a HTML Help Folder with hyper links.

This library was compiled and tested according to the Modelica language specification 3.2 under the Dymola platform version 2013. The test results prove its correction and functionalities.
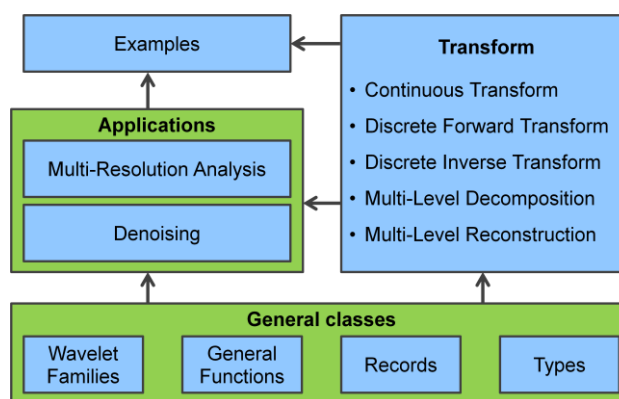


Structure of the Wavelet Library

## References

[1]  I. Daubechies. Ten Lectures on Wavelets. SIAM 1992.

[2]  T. Bunte, A. Sahin and N. Bajcinca. Inversion of Vehicle Steering Dynamics with Modelica / Dymola. Proceedings of the 4th International Modelica Conference, pp 319-328. Hamburg, Germany, March 7-8, 2005.

[3]  Y. Ji and J. Bals. A Modelica signal analysis tool towards design of More Electric Aircraft. Proceedings of 2010 International Conference on Information and Applied Electronics, pp 152 - 156. Chendu, China, June 9-11 2010.

[4]  J. Gao, Y. Ji, J. Bals and R. Kennel. Fault Detection of Power Electronic Circuit using Wavelet Analysis in Modelica. Prodeedings of the 9th International Modelica Conference, pp 513 – 521. Munich, Germany, Sept. 3-5, 2012.