



Illinois Wesleyan University
Digital Commons @ IWU

John Wesley Powell Student Research
Conference

1994, 5th Annual JWP Conference

Apr 23rd, 9:00 AM - 4:00 PM

The Recurrence Relation of B-Wavelets

Rumi Kumazawa
Illinois Wesleyan University

Tian-Xiao He, Faculty Advisor
Illinois Wesleyan University

Follow this and additional works at: <https://digitalcommons.iwu.edu/jwprc>

Kumazawa, Rumi and He, Faculty Advisor, Tian-Xiao, "The Recurrence Relation of B-Wavelets" (1994). *John Wesley Powell Student Research Conference*. 29.
<https://digitalcommons.iwu.edu/jwprc/1994/posters/29>

This Event is protected by copyright and/or related rights. It has been brought to you by Digital Commons @ IWU with permission from the rights-holder(s). You are free to use this material in any way that is permitted by the copyright and related rights legislation that applies to your use. For other uses you need to obtain permission from the rights-holder(s) directly, unless additional rights are indicated by a Creative Commons license in the record and/ or on the work itself. This material has been accepted for inclusion by faculty at Illinois Wesleyan University. For more information, please contact digitalcommons@iwu.edu.

©Copyright is owned by the author of this document.

THE RECURRENCE RELATION OF B-WAVELETS

Rumi Kumazawa and Tian-Xiao He*, Department of Mathematics, IWU

The study of wavelet functions is a relatively new area in mathematics. It is a topic of interest for both mathematicians and engineers, and applications can be seen in a wide area where Fourier transforms were used traditionally.

The wavelet functions can be used to perform the decomposition in L^2 space, the collection of all square integrable functions. This can be done with the aid of compact support functions called the B-spline functions. The B-splines act as scaling functions in order to construct specific wavelet functions - the B-wavelets.

B-spline functions as piecewise polynomials with compact supports can be relatively smooth, and their Fourier transforms possess some properties like the Dirac Delta functions. Thus B-wavelets as the dilations and translations of B-splines can be used to reproduce and to analyze signals both in the local time and local frequency domains. In addition, we can expect to find a recurrence relation of the B-spline functions with different order. Hence B-wavelets of any order can be constructed successively from the lower order ones.

My project is on constructing B-spline functions and B-wavelet functions by their recurrence relations. A program was written in Pascal in order to calculate the Bernstein-Bezier coefficients of the B-spline functions of different order, and the graphs of these functions were drawn using Mathematica. From these coefficients of the B-splines, the coefficients of corresponding B-wavelength functions were found.