

# Mathematics Colloquium Talk

Thursday, October 23, 2003, 3:20 p.m.  
Room 111 Cowley Hall

## AN INTRODUCTION TO WAVELETS VIA FILTERING

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**Abstract:** Wavelets and their applications have attracted a significant amount of attention in the past 15 years. Several departments offered graduate courses in wavelets and applications as the topic grew in popularity. In the mid to late 1990's several undergraduate texts on wavelets and applications became available. While most do a wonderful job leading the reader through the elementary theory, I believe there is a need to take students through a detailed treatment of selected applications.

In this talk, I will present a derivation of Ingrid Daubechies' classical wavelet coefficients largely motivated by ideas from engineering. In developing this derivation, I have become convinced that the topic is ideal for a sophomore/junior level "capstone-type" course that ties together ideas from calculus, linear algebra, and computer programming, that can greatly assist students before they move on to upper level applications classes (numerical analysis, second course in differential equations) or theoretical classes like real analysis.

To conclude the talk (time permitting), I will present a new result that illustrates how a general 4-term orthogonal wavelet transformation (Daubechies' and more general multiwavelets) can be factored. Daubechies and others used such a factorization to build integer to integer wavelet transformations.

