Mathematics Department Colloquium
Winter Term 2006 - 2007

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University Club, MacAlister Hall, 6th Floor

"Surfing with Wavelets"

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Wavelets are a new approach used in the analysis of sounds and images, as well as in many other applications. The wavelet transform provides a mathematical analog to a music score: just as the score tells a musician which notes to play when, the wavelet analysis of a sound takes things apart into elementary units with a well-defined frequency (which note?) and at a well-defined time (when?). For images wavelets allow you to first describe the coarse features with a broad brush, and then later to fill in details. This is similar to zooming in with a camera: first you can see that the scene is one of shrubs in a garden, then you concentrate on one shrub and see that it bears berries, then, by zooming in on one branch, you find that this is a raspberry bush. Because wavelets allow you to do a similar thing in more mathematical terms, the wavelet transform is sometimes called a "mathematical microscope". Wavelets are used by scientists for many different applications, in a wide range of fields. In addition, wavelets are also finding their uses outside science as well. The talk will start by explaining the basic principles of wavelets, which are very simple. Then they will be illustrated with some examples.