How to make wavelets from filters

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(Tea 3:30 pm Math Lounge)

Abstract

A wavelet is a function whose dilates and translates form an orthonormal basis for $L^2(\mathbb{R})$. Wavelets have proved to be enormously useful in both theory and applications, and hence there has been a great deal of interest in methods of constructing wavelets. One famous construction of Mallat starts from a filter, which is a function defined on the unit circle. In this talk we will show how some basic ideas from abstract algebra and the geometry of Hilbert space make Mallat's construction seem very natural, and in particular explain how it is that a function on the circle can give rise to a basis for functions on the real line.

Any new ideas in this talk are joint work with Nadia Larsen of the University of Oslo.

This talk should be accessible to graduate students.