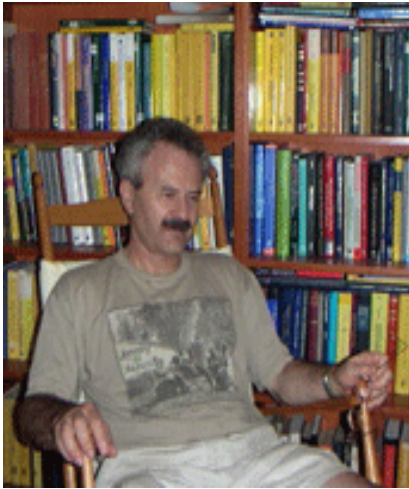




Spring 2009 Seminar Series



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<http://www.wavelets.com>

Friday, February 13, 2009

Time: 3:00 - 4:00 PM

Room: BSE 2.102

Generalized Huygens Principle using Pulsed-Beam Wavelets

Abstract: Huygens' principle states that the wave radiated by a bounded source can be represented as a sum of spherical 'wavelets' radiated from the points on a surface enclosing the source. Choosing the surface to be the sphere S of radius R , we prove that this formula can be continued analytically by complexifying R to $R'=R+ia$. We show that the resulting complex version of Huygens' principle has the following *real* interpretation:

- (a) The points of the complexified sphere S' can be reinterpreted as real disks of radius a tangent to the real sphere S . Thus S' is reinterpreted as a real *tangent disk bundle* with base S .
- (b) The spherical Huygens wavelets radiated by the points of S are deformed by the analytic continuation to *pulsed beams* radiated by the tangent disks of S' . These *pulsed-beam wavelets* are essentially analytic continuations of retarded wave propagators.
- (c) The generalized Huygens principle is a completeness relation for pulsed-beam wavelets, stating that every bounded source can be represented as a superposition of such wavelets. The coefficients in this superposition are related to the reception amplitudes of the interior wave by the tangent disks. Some possible applications will be discussed.