

Center for Applied Mathematical Sciences
Distinguished Lecture

George Papanicolaou



Imaging with noise

Abstract: It is somewhat surprising at first that it is possible to locate a network of sensors from cross correlations of noise signals that they record. This is assuming that the speed of propagation in the ambient environment is known and that the noise sources are sufficiently diverse. If the sensor locations are known and the propagation speed is not known then it can be estimated from cross correlation information. Although a basic understanding of these possibilities had been available for some time, it is the success of recent applications in seismology that have revealed the great potential of correlation methods, passive sensors and the constructive use of ambient noise in imaging. I will introduce these ideas in an interdisciplinary, mathematical way and show that a great deal can be done with them. Things become more complicated, and mathematically more interesting, when the ambient medium is also strongly scattering. I will end with a review of what is known so far in this case, and what might be expected.

Friday April 17, 2009
University of Southern California
Ethel Percy Andrus Gerontology Center
Leonard Davis Auditorium

Reception: 3:00-3:30 pm
Lecture: 3:30-4:30 pm

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George Papanicolaou is the Roger Grimmett Professor in Mathematics at Stanford University. His many contributions to scientific research include those to waves and diffusion in inhomogeneous or random media. His work has important applications to wave propagation in the atmosphere, underwater sound, and diffusion in porous media. He has worked on financial mathematics and the use of asymptotics in the analysis of complex models of the financial markets. His many honors and awards include memberships in the National Academy of Sciences and the American Academy of Arts and Sciences, an Honorary Doctorate of Sciences at the University of Athens, a Guggenheim Fellowship, and the SIAM Von Neumann Prize.