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Karim Ghazi Sabra* (ksabra@mpl.ucsd.edu), 9500 Gilman Drive, San Diego, CA 92093-0238,
and **William A Kuperman**. *Extracting coherent information from the cross-correlations of
random wavefields. A tool for time-reversal imaging without a source.*

It has been demonstrated theoretically and experimentally that an estimate of the Green's function between two receivers can be obtained from the long-time average of the cross-correlation of ambient noise at these two receivers in various environments and frequency ranges of interest: ultrasonics, underwater acoustics and seismology. This result provides a means for passive imaging using the ambient noise field only, without the use of active sources. The coherent wavefronts emerge from a correlation process that accumulates contributions over time from noise sources whose propagation path passes through both receivers. The validity of the technique is supported by a physical argument based on time-reversal invariance since the time-reversal mirrors is a correlation process between the point source and points located in the focal zone. Indeed, the coherent noise source distributions can be considered as a time-reversal mirror and the cross-correlation operations gives the field measured at one receiver after refocusing on the other receiver. We present acoustics and seismic experimental results such as using noise for time synchronization and localization of unconnected acoustic receivers, and for constructing passive tomographic images of the environment. (Received September 26, 2005)