1058-78-129 **Gang Bao**, **Shui-Nee Chow**, **Peijun Li*** (lipeijun@math.purdue.edu) and **Haomin Zhou**.

An Inverse Random Source Problem for the Helmholtz Equation in One Dimension.

Consider the wave propagation in the one-dimensional stochastic Helmholtz equation with the source function driven by the Wiener process. To determine the random wave field, the direct problem is equivalently formulated as a two-point stochastic boundary value problem. This problem is shown to have pathwise existence and uniqueness of a solution. Furthermore the solution is explicitly deduced with a compact form using the integrated solution method. Since the source and hence the radiated field are stochastic, the inverse problem is to reconstruct the statistical structure, such as the mean value and variance, of the source function from physically realizable measurements of the radiated field. Based on the constructed solution for the direct problem, explicit formulas are derived to connect the mean value and variance of the random source to the Fourier transform of the measurements, which can be efficiently implemented by the fast Fourier transform. Numerical examples will be presented to demonstrate the validity and effectiveness of the proposed method. (Received February 11, 2010)