

George Papanicolaou, Stanford University

``Time reversal imaging''

March 11, 1999

Seismic, ultrasound, electromagnetic, and other imaging requires the solution of very complex inverse problems where we attempt to identify the medium parameters from the reflections of probing signals. A very good way to `image' the medium that is being probed is to send back into it the received reflections, time reversed or conjugated.

I will introduce this problem mathematically, explain its physical significance, explain what kind of problems arise in attempting to quantify `resolution' and explain what role small scale, random inhomogeneities play in this. I will also show the results of several numerical experiments that illustrate the theoretical results. I will end with the formulation of some interesting unsolved problems.