1027-65-97 **Chrysoula Tsogka*** (tsogka@tem.uoc.gr), Dept. of Applied Mathematics, University of Crete, GR-71409 Heraklion, Crete, Greece, and **Liliana Borcea** and **George Papanicolaou**. *Optimal illumination and waveform design for imaging in random media.*

We consider the problem of determining the optimal illumination for imaging in clutter. We propose several imaging algorithms that are based on the use of the Coherent Interferometric (CINT) imaging functional, which can be viewed as a smoothed version of Kirchhoff migration. While smoothing increases the statistical stability of the image it also causes blurring. The optimal trade-off between statistical stability and blurring is obtained with the adaptive version of CINT that determines two clutter dependent parameters, the decoherence length and frequency. We address here the question of obtaining the best illumination for imaging. To do so, we formulate the problem as a constraint optimization and we use an optimization criterion that is based on the quality of the image. The use of the optimal illumination algorithms improves significantly the resolution of the images as we will illustrate with several numerical examples. (Received February 20, 2007)