ACOUSTICS2008/1171
Dispersion curve estimation with particle filters for geoacoustic inversion

Ivan Zorych and Zoi-Heleni Michalopoulou
Department of Mathematical Sciences, New Jersey Institute of Technology, 323 M L King Blvd, Newark, NJ 07102, USA

In this work we extend our particle filtering method for dispersion curve extraction from spectrograms of acoustic signals that have propagated in underwater environments, the goal being to obtain accurate representation of modal dispersion for geoacoustic inversion. The approach combines particle filtering with modeling of sound propagation in ocean environments to track dispersion curves of multimodal signals in noisy environments. In addition to providing connected modal "trajectories" that facilitate the computation of maximum a posteriori estimates of modal arrival times, the method provides posterior probability distributions for arrival times, quantifying errors that are then propagated into the geoacoustic inversion process. The method, thus, allows the calculation of posterior probability distributions of geoacoustic parameters. We present results from both synthetic and real data from the Gulf of Mexico experiment. [Work supported by ONR.]