Geophysical Research Abstracts,
Vol. 10, EGU2008-A-02822, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-02822
EGU General Assembly 2008

Probing the seafloor with nonlinear compressional waves

B. McDonald

U. S. Naval Research Laboratory, Washington DC 20375 USA (mcdonald@sonar.nrl.navy.mil)

Nonlinear compressional waves incident on granular seafloor sediment can be used to investigate nonlinear properties of the sediment. It has been proposed that dynamic nonlinearity (shock propagation) results in a much higher nonlinearity coefficient than static nonlinearity [J. Acoust. Soc. Am. 102, 2521, 1997]. In static tests, samples are placed in a pressurized vessel and the linear compressional wave speed is determined as a function of ambient pressure [Acustica 38, 195, 1977]. With dynamic nonlinearity, however, the medium is taken from ambient conditions to high pressure across a thin shock front with differential fluid- grain flow and inter- grain stresses contributing to the wave propagation dynamics. This paper presents theoretical and numerical investigation of focused nonlinear waves propagating through the water column and impinging on saturated sediment. It is shown that shock formation can increase the focal gain of a piston- generated collapsing wave. Work supported by the U. S. Office of Naval Research.