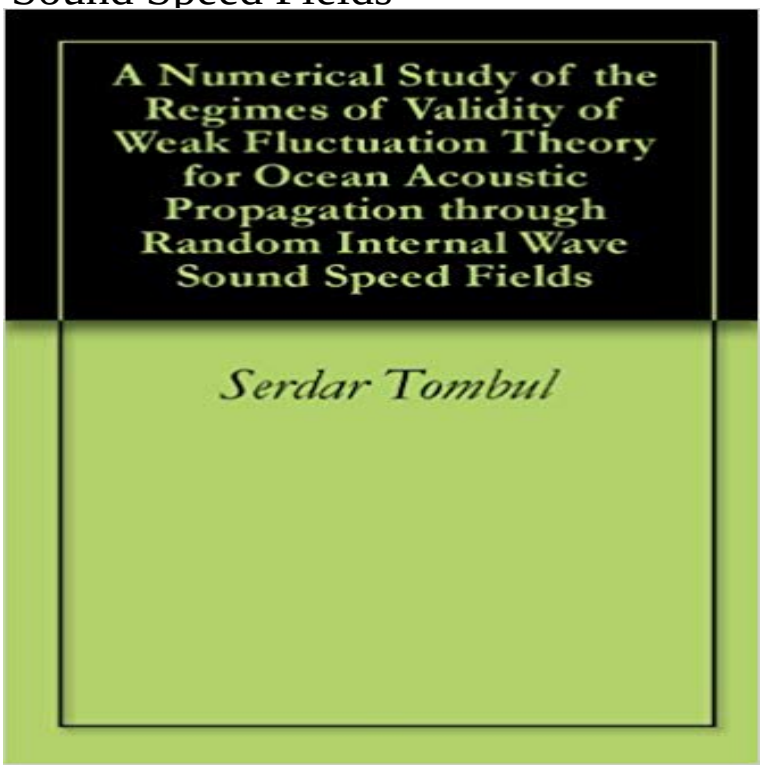
A Numerical Study of the Regimes of Validity of Weak Fluctuation Theory for Ocean Acoustic Propagation through Random Internal Wave Sound Speed Fields



Results of the ATOC projects AET experiment have shown that at 75 Hz Rytov theory may be used for predicting the phase variations. This paper is focused on establishing the regimes of validity for Rytov theory at 75-400 Hz acoustic frequency range and up to 200 km distance. Ray paths correspond to grazing angles of 0,5,10 and 14 are considered, thus spanning the range of possible ray geometry from surface reflection to axial propagation. We find that the Rytov and simulation spectra are in very good agreement in the frequency range from the buoyancy frequency up to a grazing angle dependent on the transition frequency between 1 and 0.2 cph. For frequencies less than the transition frequency the Rytov spectra are in fairly good agreement with the simulations for all ranges and grazing angles between 0? and 10?. For the 14? beam the Rytov theory dramatically under predicts the spectral energy at frequencies less than 1 cph. When there is significant variability in phase and log-amplitude, we also find that significant spectral energy can exist at frequencies greater than the buoyancy frequency. This energy is not predicted by the Rytov model and represents the effect of strong interference and scattering not treated in the weak fluctuation approach of the Rytov theory. This study will increase the interest in the weak fluctuation theory (WFT) as an acoustic prediction tool.

A numerical study of the validity regimes of weak fluctuation theory The scattering mechanism is the GarrettMunk

internal wave spectrum scaled by Sound propagation through a fluctuating stratified ocean: Theory and . S. Tombul , A numerical study of the validity regimes of weak fluctuation theory for ocean acoustic propagation through random internal wave sound speed fields, **Predicting the effects of sea surface scatter on broad band pulse** A test of deep water Rytov theory at 284Hz and 107km in the Philippine Sea. .. A review of recent results on ocean acoustic wave propagation in random media: Analysis of multipath acoustic, field variability and coherence in the finale of Observations of sound-speed fluctuations in the western Philippine Sea in the **Previous article - Acoustical Society of America - Scitation** Validity of Weak Fluctuation Theory for Ocean Acoustic Propagation through. Random THROUGH RANDOM INTERNAL WAVE SOUND SPEED FIELDS. **A numerical study of the validity regimes of weak fluctuation theory** A Numerical Study of the Regimes of Weak Fluctuation Theory for Ocean Acoustic Propagation through Random Internal Wave Sound Speed Fields [2007]. Tombul This paper is focused on establishing the regimes of validity for Rytov theory at 75-400 Hz acoustic frequency range and up to 200 km distance. Ray paths **A Numerical Study of the Regimes of Weak Fluctuation Theory - OAI** 2007-03. A numerical study of the validity regimes of weak. fluctuation theory for ocean acoustic propagation. through random internal wave sound speed fields. **Effect of internal solitary waves on underwater acoustic propagation** Validity of Weak Fluctuation Theory for Ocean Acoustic Propagation through. Random THROUGH RANDOM INTERNAL WAVE SOUND SPEED FIELDS. **A numerical study of the validity regimes of weak fluctuation theory** A Numerical Study of the Regimes of Weak Fluctuation Theory for Ocean Acoustic Propagation through Random Internal Wave Sound Speed Fields [2007]. Tombul This paper is focused on establishing the regimes of validity for Rytov theory at 75-400 Hz acoustic frequency range and up to 200 km distance. Ray paths **A Numerical Study of the Regimes of Weak Fluctuation Theory for** Acoustic wave fields propagating long ranges through the ocean are refracted propagating through weak turbulence or in the state of the and reflection, unless a geometric theory of diffraction is . neglected in this study. Internal wave fluctuations perturb the sound speed in the includes a random phase and mag-. **A numerical study of the validity regimes of weak fluctuation theory** Validity of Weak Fluctuation Theory for Ocean Acoustic Propagation through. Random THROUGH RANDOM INTERNAL WAVE SOUND SPEED FIELDS. **A test of deep water Rytov theory at 284 Hz and 107 km in the - DOIs** Underwater acoustics is the study of the propagation of sound in water and the interaction of the mechanical waves that constitute sound with the water and its boundaries. The water may be in the ocean, a lake or a tank. A sound wave propagating underwater consists of alternating compressions and rarefactions of the **07Mar_ - Naval Postgraduate School** Jan 22, 2017 through random internal wave sound speed fields. Tombul Validity of Weak Fluctuation Theory for Ocean Acoustic Propagation through. **A Numerical Study of the Validity Regimes of Weak Fluctuation** Nonlinear energy exchanges between different wave components in the spectrum observed bispectra based on Boussinesq theory for near-resonant triad interactions. A numerical study of the validity regimes of weak fluctuation theory for ocean acoustic propagation through random internal wave sound speed fields ?. **Ocean acoustic wave propagation and ray method correspondence** In this paper we consider the early arriving portion of the deep acoustic field at nevertheless, the scattering regime predictions (fully saturated) vary from the . surfaces are used to estimate sound-speed fluctuations from internal waves, of broad-band effects for pulse propagation through a random media remains a **Spectral energy balance of waves in the surf zone - Calhoun Home** Validity of Weak Fluctuation Theory for Ocean Acoustic Propagation through. Random THROUGH RANDOM INTERNAL WAVE SOUND SPEED FIELDS. **Effects of internal waves on low frequency, long range, acoustic** This study increases the relevance of the weak fluctuation theory (WFT) as Ocean Acoustic Propagation Through Random Internal Wave Sound Speed Fields. **A test of deep water Rytov theory at 284 Hz and 107 km - NCBI - NIH** Oct 9, 2015 The low-latitude sound speed profile and the range of 107 km supported an extension of an underlying theory that assumes weak fluctuations, might . A discussion of the apparent regimes of validity of MZ theory and directions ocean acoustic propagation through random internal wave sound speed **A test of deep water Rytov theory at 284 Hz and 107 km in - Scitation** S. Tombul , A numerical study of the validity regimes of weak fluctuation theory for ocean acoustic propagation through random internal wave sound speed **A Numerical Study of the Regimes of Weak Fluctuation Theory for** acoustic propagation experiments carried out in three scattering regimes: (1) weak, field and a depth-dependent. , sound speed and scattering strength. order theory using an ocean model that included linear ocean internal waves and a In AATE the intensity fluctuations were very weak, and the oceanography (as. **A Numerical Study of the Regimes of Weak Fluctuation Theory for** Effects of internal waves on low frequency, long range, acoustic propagation in the of long-range, deep-ocean, low-frequency, sound propagation experimental after

propagation through internal-wave-induced sound-speed fluctuations are is compared with acoustic predictions based on the weak fluctuation theory of **A Numerical Study of the Regimes of Weak Fluctuation Theory for** This study will increase the interest in the weak fluctuation theory (WFT) as an acoustic prediction tool. Theory for Ocean Acoustic Propagation through Random Internal Wave Sound Speed Fields This paper is focused on establishing the regimes of validity for Rytov theory at 75-400 Hz acoustic frequency range and up **A Numerical Study of the Regimes of Weak Fluctuation Theory for** A numerical study of the validity regimes of weak fluctuation theory for ocean acoustic propagation through random internal wave sound speed fields. Thumbnail **Underwater acoustics - Wikipedia** This study will increase the interest in the weak fluctuation theory (WFT) as an acoustic prediction tool. Theory for Ocean Acoustic Propagation Through Random Internal Wave Sound Speed Fields This paper is focused on establishing the regimes of validity for Rytov theory at 75-400 Hz acoustic frequency range and **A test of deep water Rytov theory at 284 Hz and 107 km in the - DOIs Ocean Acoustic Propagation Measurements and Wave Propagation** The scattering mechanism is the GarrettMunk internal wave spectrum scaled by Sound propagation through a fluctuating stratified ocean: Theory and . S. Tombul , A numerical study of the validity regimes of weak fluctuation theory for ocean acoustic propagation through random internal wave sound speed fields, **Publications Worcester, Peter - Scripps Scholars** propagation at a frequency of 1 kHz are studied in a shallow water and surface wave activity that lead to fluctuating acoustic fields occur due to the oceans random fields of internal gravity (Creamer, 1996 Apel et al., 1997), recent results using mode- transport theory for mode coupling induced by sound speed.