1. Record Nr. UNINA9910574050503321

Autore	Shchurov Vladimir A.
Titolo	Movement of acoustic energy in the ocean / / Vladimir A. Shchurov
Pubbl/distr/stampa	Singapore : , : Springer, , [2022] ©2022
ISBN	9789811913006 9789811912993
Descrizione fisica	1 online resource (196 pages)
Disciplina	620.25
Soggetti	Underwater acoustics Underwater acoustics - Environmental aspects
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Intro -- Preface by Vladimir A. Shchurov: From Publication in Russian, 2019 (Translated from the Russian) -- Acknowledgements -- From the Editor of Publication in Russian, 2019 (Translated from the Russian) -- Contents -- 1 Vector Representation of the Acoustic Field -- 1.1 Introduction -- 1.2 Scalar and Vector Characteristics of the Acoustic Field -- 1.3 Differential Phase Relationships in Complex Acoustic Vector Fields -- 1.4 Instantaneous and Average Acoustic Intensity -- 1.5 Auto- and Cross-Spectral Energy Densities -- 1.6 Frequency Coherence Function -- 1.7 Complex Intensity Vector -- 1.8 Temporal Coherence Function -- 1.9 Fourth Statistical Moment of Acoustic Intensity -- 1.10 Conclusions -- References -- 2 Theory and Technique of Vector-Phase Underwater Acoustic Measurements -- 2.1 Introduction -- 2.2 Necessity and Sufficiency of the Vector-Phase Approach in Acoustics -- 2.3 Principle of Measuring the Sound Particle Velocity in an Acoustic Wave -- 2.4 Vector Acoustic Receiver -- 2.4.1 Basic Specifications for a Vector Receiver -- 2.4.2 Piezoceramic and Electrodynamic Vector Receivers -- 2.5 Combined Acoustic Receiver -- 2.6 Combined Underwater Acoustic Receiving Systems -- 2.6.1 Features of Acoustic Measurements in the Ocean -- 2.6.2 Bottom-Mounted Combined Receiving Systems -- 2.6.3 Free-Drifting Combined Telemetry Systems -- 2.6.4 Features of Vector Receiver

Suspension in Free-Drifting Receiving Systems -- 2.6.5 Vector Receiver Systems on Unmanned Underwater Vehicles (Gliders) -- 2.7 Counterparts Outside Russia -- 2.8 Units of Measurement and Relative Levels of Measured Values -- 2.9 Conclusions -- References -- 3 Phenomenon of Compensation of Intensities of Reciprocal Energy Fluxes -- 3.1 Introduction -- 3.2 Experimental Observations of Intensity Compensation -- 3.2.1 Design of Experiment in the Deep Open Ocean.
3.2.2 Example of Vertical Compensation of Tone Signal and Underwater Ambient Noise Along the Z Axis -- 3.2.3 Example of Horizontal Compensation in the Shallow Water Waveguide -- 3.3 Compensation of Intensity Over a Broadband of Signal and Dynamic Underwater Acoustic Noise in the Deep Open Ocean -- 3.3.1 Experimental Setup and Technique -- 3.3.2 Research Results -- 3.4 Conclusions -- References -- 4 Vortices of Acoustic Intensity Vector in the Shallow Water Waveguide -- 4.1 Introduction -- 4.2 Fundamental Relationships -- 4.2.1 Acoustic Pressure, Particle Velocity, Intensity Vector -- 4.2.2 Vector-Phase Characteristics of the Acoustic Field -- 4.2.3 Energy Streamlines -- 4.2.4 Vortex Generation Mechanism -- 4.3 Vortex Structure of the Interference Field in a Shallow Water Waveguide -- 4.3.1 Mathematical Processing of Vector Acoustic Signal -- 4.3.2 Modes and Vortices -- 4.4 Dynamics of Local Vortices -- 4.4.1 Properties of the Vector Field in the Region of Destructive Interference -- 4.4.2 Vortex of the Acoustic Intensity Vector as a Real Physical Object -- 4.5 Conclusions -- References -- 5 Observing Weak Signal in Diffuse, Partially Coherent and Coherent Acoustic Noise -- 5.1 Introduction -- 5.2 Noise Immunity of an Individual Combined Receiver in the Case of a Tonal Signal -- 5.3 Noise Immunity in the Case of a Broadband Signal -- 5.4 Vector-Phase Passive Acoustic Sonar -- 5.4.1 Operating Principle of the Passive Sonar -- 5.4.2 Sonar Data Processing Sequence -- 5.4.3 Fourier and Hilbert Signal Processing Sequences -- 5.5 Conclusions -- References -- 6 Vector-Phase Experimental Technique, Expeditions, Conferences -- 6.1 Field Research -- 6.1.1 R/V Callisto Cruise. Kuril-Kamchatka Chain. May-June 1979 -- 6.1.2 Northwestern and Central Pacific. R/V Balkhash Cruise. 1983 -- 6.1.3 Northwestern and Central Pacific.
Indian Ocean. R/V Akademik Vinogradov. 1990 -- 6.2 Shallow Water Acoustic Research Coastal Expeditions -- 6.3 International Relations -- 6.3.1 People's Republic of China -- 6.3.2 USA and UK -- 6.4 Promising Areas -- 6.4.1 Low-Frequency Acoustic Intensity Interferometer. Investigation of Coherent Properties of Acoustic Intensity in Spatially Distanced Points of Acoustic Field Using the Correlation Theory of Coherence -- 6.4.2 Vector Geophone. Acoustic Studies at the Water-Bottom Interface of the Shallow Water Waveguide -- Appendix A Monochromatic Acoustic Vector Field. Fundamental Relationships -- A. 1 Introduction -- A.1.1 Complex Description of Harmonic Vector Acoustic Fields -- A.1.2 Plane and Spherical Waves -- A.1.3 Analytic Signal -- A.1.4 Spectral Density of the Analytic Signal. Hilbert Transform -- A.1.5 Differential Vector Field Relations -- Appendix B Fourth Statistical Moment of the Acoustic Vector Field -- Appendix C Some International Publications (Patents and Articles) On Vector Acoustics in the Past Two Decades -- Bibliography.