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Autore	Portis, Alan M. <1926- >
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Autore	Shneider Mikhail N.
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Nota di bibliografia	Includes bibliographical references.
Nota di contenuto	1. Introductory description of processes related to the negative pressure in liquids -- 1.1. A qualitative picture of the formation of discontinuities in a liquid -- 1.2. Negative pressure -- 1.3. Rayleigh bubble -- 1.4. Viscosity accounting in Rayleigh's equation for a bubble in a liquid -- 1.5. Dynamics of a bubble in the liquid -- 1.6. Zel'dovich-Fisher nucleation -- 1.7. Qualitative description of the processes in a liquid dielectric in a non-uniform pulsed electric field -- 1.8. Flat capacitor dipped in a dielectric fluid -- 1.9. The polarization (Maxwell) time -- 1.10. The flow induced in the vicinity of a needle-like electrode : a hydrostatic pressure 2. Classic cavitation -- 2.1. Definition of cavitation and formulation of the basic problem -- 2.2. Cavitation in the subsonic flow of fluid in a pipe -- 2.3. Condition for cavitation bubble formation near propeller blades -- 2.4. Cavitation generated by acoustic and shock waves -- 2.5. Surface tension of a curvilinear surface with a small radius of curvature -- 2.6. A new look at nucleation 3. The physical properties of liquid dielectrics -- 3.1. Water -- 3.2. Experimental data related to oil and some other liquid dielectrics -- 3.3. Liquid helium 4. A liquid dielectric in an electric field -- 4.1. Dielectric as a system of dipoles -- 4.2. The potential of a system of dipoles -- 4.3. The dielectric constant -- 4.4. The energy of the electric field -- 4.5. Energy of a dielectric in an external electric field -- 4.6. Dielectric ball in a homogeneous dielectric medium in an external constant electric field -- 4.7. Polarizability of atoms and molecules -- 4.8. Ponderomotive forces in liquid dielectrics -- 4.9. Forces acting on the boundary between two dielectrics -- 4.10. Forces acting on a boundary of a dielectric sphere 5. Dynamics of a dielectric liquid in a non-uniform pulsed electric field -- 5.1. System of equations and boundary conditions in prolate spheroidal coordinates -- 5.2. Numerical results and discussions -- 5.3. Flow arising at adiabatic switching of voltage and its rapid shutdown -- 5.4. Linearized equations and example results -- 5.5. Comparison of numerical results with measurements -- 5.6. Initiation of cavitation and nanosecond breakdown in oil on water micro-droplets -- 5.7. Qualitative analysis of a drop deformation in the pulsed electric field 6. Cavitation in inhomogeneous pulsed electric fields -- 6.1. Ponderomotive forces in the vicinity of a nanopore -- 6.2. Nucleation in inhomogeneous pulsed electric fields -- 6.3. Expansion of nanopores in an inhomogeneous pulsed electric field -- 6.4. Concluding remarks for chapter 6 7. Liquid helium in a non-uniform pulsed electric field -- 7.1. Dynamics of liquid helium in a non-uniform pulsed electric field -- 7.2. Regimes of cavitation inception in liquid helium -- 7.3. Tunnel effect in liquid helium at negative pressure -- 7.4. Possible limitations associated with the dielectric strength of liquid helium -- 7.5. Conclusions to chapter 7 8. Optical diagnostics in dielectric liquids in inhomogeneous pulsed fields -- 8.1. Shadowgraph and Schlieren methods -- 8.2. Rayleigh scattering on the cavitation region emerging in liquids -- 8.3. Optical emission spectroscopy of nano- and sub-nanosecond discharge in liquids 9. Breakdown in liquid in pulsed electric fields -- 9.1. Brief overview of the experimental data -- 9.2. Problems of the ionization model of the breakdown development in liquid -- 9.3. Problems of the bubble breakdown model -- 9.4. The cavitation discharge model and analysis

	of experimental data -- 9.5. Qualitative picture of the nanosecond breakdown in liquids -- 9.6. The area of breakdown initiation at a nanosecond voltage pulse in the vicinity of a needle-like electrode -- 9.7. The problem of primary electrons.
Sommario/riassunto	Written by leading experts in the field, the first edition of this textbook was the first of its kind to address numerous potential applications such as the technology of high-voltage insulation in pulsed inhomogeneous fields, and applications related to cavitation development in liquid dielectrics, treatment of different materials and plasma medicine. This new expanded edition also addresses the development of the theory over the past few years and features extensive revisions and some expanded chapters. It is intended for a broad audience, from students to engineers and scientists, who are interested in current research questions in electrodynamics and hydrodynamics of liquid dielectrics. Part of IOP Series in Plasma Physics.