IOP Plasma Physics Series

Liquid Dielectrics in an Inhomogeneous Pulsed Electric Field

M N Shneider and M Pekker

This book comprehensively describes the phenomena that occur in liquid dielectrics under the influence of an inhomogeneous pulsed electric field. Written by leading experts in the field, it is 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, plasma treatment of different materials and plasma medicine dealing with living cells. The book includes data about the material properties of polar and non-polar liquid dielectrics, and presents the dynamics of dielectric fluids under the action of ponderomotive forces. The conditions for the formation of cavitation are reviewed, its dynamics, and its observation by optical methods in a variety of liquid dielectrics (from water to superfluid helium). The cavitation mechanism of nano- and sub-nanosecond breakdown in liquid dielectrics is also discussed.

Liquid Dielectrics in an Inhomogeneous Pulsed Electric Field 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.

About the authors

Dr Mikhail Shneider is a senior scientist in the Applied Physics Group at the Mechanical and Aerospace Engineering Department, Princeton University. His research interests include the theoretical study of gas discharge physics, physical gas dynamics, biophysics, atmospheric electrical phenomena, non-linear optics, and laser–matter interaction. Dr Mikhail Pekker is research scientist in the Department of Mechanical and Aerospace Engineering at George Washington University. His research interests are the theoretical study of gas discharge physics and biophysics.

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