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"This book presents a new gradient-type theory that takes into account the changes in material microstructure, or the local mass displacement, and describes coupled processes of deformation and heat conduction in dielectrics. The proposed theory can explain many phenomena appearing in dielectric materials."

Prof. Yuriy Povstenko
Jan Dlugosz University in Czestochowa, Poland

"This book offers a new approach to the construction of gradient-type mathematical models of elastic polarized continua. The developed model is capable of predicting nonlocal effects, such as the near-surface and size effects and therefore can be effectively used to study the electromechanical properties of micro-/nanoscale structures. The text is easy to read and lies within the grasp of both undergraduate and postgraduate students with basic knowledge in the area of generalized theories of dielectrics."

Prof. Yaroslav A. Zhuk
Taras Shevchenko National University of Kyiv, Ukraine

"Since the classical theory of dielectrics is based on the local constitutive equations, it cannot explain the specific electromechanical behavior of small-scale structures. This book presents a new gradient-type continuum theory of electrothermoelasticity for capturing surface and size effects that may be of special interest in designing small-sized devices utilizing microbeam elements, films, fibers, etc."

Prof. Olexander Andrejkiv
Ivan Franko National University of Lviv, Ukraine

Devoted to the development of a local gradient theory of dielectrics, this book begins with a brief description of the known approaches to the construction of generalized (integral- and gradient-type) continuum theories. It then presents a new continuum-thermodynamic approach for constructing the nonlinear local gradient theory of thermoelastic and non-ferromagnetic polarized media. This approach considers non-diffusive and non-convective mass fluxes associated with changes in material microstructure. Within the linear approximation, the theory has been applied to study the transition modes of the formation of near-surface inhomogeneity of coupled fields in solids, disjoining pressure in thin films, etc. The theory describes a number of observable phenomena that cannot be explained within the classical theory of dielectrics, including the surface, size, piezoelectric, pyroelectric, and thermopolarization effects in centrosymmetric crystals; Mead's anomaly; and high-frequency dispersion of elastic waves.

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