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Titolo	Quantized Vortex Dynamics and Superfluid Turbulence [[electronic resource] /] / edited by C.F. Barenghi, R.J. Donnelly, W.F. Vinen
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Collana	Lecture Notes in Physics, , 0075-8450 ; ; 571
Disciplina	530.42
Soggetti	Superconductivity Superconductors Fluids Phase transformations (Statistical physics) Condensed materials Strongly Correlated Systems, Superconductivity Fluid- and Aerodynamics Quantum Gases and Condensates
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Nota di bibliografia	Includes bibliographical references at the end of each chapters and index.
Nota di contenuto	to Superfluid Vortices and Turbulence -- Turbulence Experiments -- An Introduction to Experiments on Superfluid Turbulence -- The Experimental Evidence for Vortex Nucleation in 4He -- Applications of Superfluid Helium in Large-Scale Superconducting Systems -- The Temperature Dependent Drag Crisis on a Sphere in Flowing Helium II -- Experiments on Quantized Turbulence at mK Temperatures -- Grid-Generated He II Turbulence in a Finite Channel - Experiment -- Intermittent Switching Between Turbulent and Potential Flow Around a Sphere in He II at mK Temperatures -- Vortex Dynamics -- Vortex Filament Methods for Superfluids -- to HVBK Dynamics -- Magnus Force, Aharonov-Bohm Effect, and Berry Phase in Superfluids -- Using the HVBK Model to Investigate the Couette Flow of Helium II -- Turbulence Theory -- An Introduction to the Theory of Superfluid Turbulence -- Numerical Methods for Coupled Normal-Fluid and

Superfluid Flows in Helium II -- From Vortex Reconnections to Quantum Turbulence -- Vortices and Stability in Superfluid Boundary Layers -- Grid Generated He II Turbulence in a Finite Channel— Theoretical Interpretation -- Vortex Tangle Dynamics Without Mutual Friction in Superfluid 4He -- Applications of the Gaussian Model of the Vortex Tangle in the Superfluid Turbulent He II -- Stochastic Dynamics of a Vortex Loop. Thermal Equilibrium -- Stochastic Dynamics of a Vortex Loop. Large-Scale Stirring Force -- Nonequilibrium Vortex Dynamics in Superfluid Phase Transitions and Superfluid Turbulence -- The NLSE and Superfluidity -- The Nonlinear Schrödinger Equation as a Model of Superfluidity -- Vortex Nucleation and Limit Speed for a Flow Passing Nonlinearly Around a Disk in the Nonlinear Schrödinger Equation -- Vortices in Nonlocal Condensate Models of Superfluid Helium -- Ginzburg-Landau Description of Vortex Nucleation in a Rotating Superfluid -- Weak Turbulence Theory for the Gross-Pitaevskii Equation -- Dissipative Vortex Dynamics and Magnus Force -- Transition to Dissipation in Two- and Three-Dimensional Superflows -- Bose-Einstein Condensation -- Motion of Objects Through Dilute Bose-Einstein Condensates -- Stability of a Vortex in a Rotating Trapped Bose-Einstein Condensate* -- Kinetics of Strongly Non-equilibrium Bose-Einstein Condensation -- Quantum Nucleation of Phase Slips in Bose—Einstein Condensates -- Vortex Reconnections and Classical Aspects -- Vortex Reconnection in Normal and Superfluids -- Helicity in Hydro and MHD Reconnection -- Tropicity and Complexity Measures for Vortex Tangles -- The Geometry of Magnetic and Vortex Reconnection -- Current-Sheet Formation near a Hyperbolic Magnetic Neutral Line -- Nonlocality in Turbulence -- Helium 3 and Other Systems -- Quantized Vorticity in Superfluid 3He-A : Structure and Dynamics -- Vortices in Metastable 4He Films -- Quantum Hall Effect Breakdown Steps and Possible Analogies with Classical and Superfluid Hydrodynamics -- Atomic Bose Condensate with a Spin Structure: The Use of Bloch State -- Quantum Dynamics of Vortex-Antivortex Pairs in a Circular Box.

Sommario/riassunto

This book is primarily concerned with turbulence in superfluid helium. Quantized vorticity has traditionally generated great interest among physicists but there are now also important engineering applications, such as liquid helium cooling of superconducting magnets. Presently much research is done on the relationship between superfluid turbulence and classical turbulence, as intense turbulence can be generated in liquid helium due to its small kinematic viscosity. There is also a close relationship between superfluid behaviour and quantized vorticity in liquid helium and in atomic Bose-Einstein condensates. Putting special emphasis on the interplay between the different disciplines involved, this readable account of recent research will appeal not only to established researchers but also to newcomers and graduate students wishing to enter the field.
