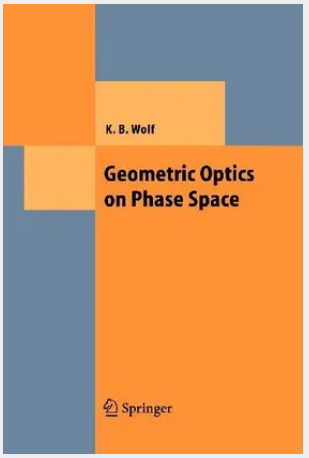
Wolf

Geometric Optics on Phase Space



Symplectic geometry, well known as the basic structure of Hamiltonian mechanics, is also the foundation of optics. In fact, optical systems (geometric or wave) have an even richer symmetry structure than mechanical ones (classical or quantum). The symmetries underlying the geometric model of light are based on the symplectic group. **Geometric Optics on Phase Space** develops both geometric optics and group theory from first principles in their Hamiltonian formulation on phase space. This treatise provides the mathematical background and also collects a host of useful methods of practical importance, particularly the fractional Fourier transform currently used for image processing. The reader will appreciate the beautiful similarities between Hamilton's mechanics and this approach to optics. The appendices link the geometry thus introduced to wave optics through Lie methods. The book addresses researchers and graduate students.

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