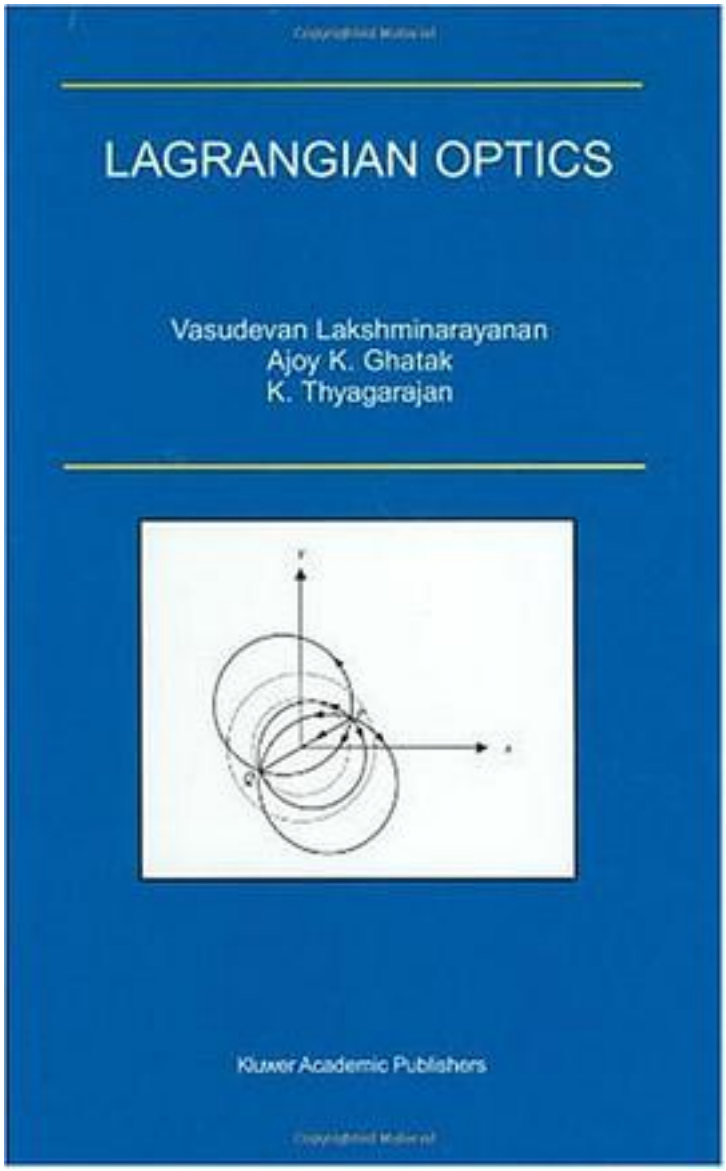
Lagrangian Optics



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In geometrical optics, light propagation is analyzed in terms of light rays which define the path of propagation of light energy in the limit of the optical wavelength tending to zero. All of geometric optics can be derived from Fermat's principle which is an extremum principle. The counterpart in classical mechanics is of course Hamilton's principle. There is a very close analogy between mechanics of particles and optics of light rays. In Lagrangian Optics, the authors begin with Fermat's principle and obtain the Lagrangian and Hamiltonian pictures of ray propagation through various media. Given the current interest and activity in optical fibers and optical communication, analysis of light propagation in inhomogeneous media is dealt with in great detail. The past decade has witnessed great advances in adaptive optics and compensation for optical aberrations. The formalism described herein can be used to calculate aberrations of optical systems. Toward the end of the book, applications of the formalism to current research problems are presented. Of particular interest is the use of dynamic programming techniques which can be used to handle variational/extremum problems. This method has only recently been applied to optical problems.

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