General transformation theory of Lagrangian mechanics and the Lagrange group

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Abstract

The general transformation theory of Lagrangian mechanics is revisited from a group-theoretic point of view. After considering the transformation of the Lagrangian function under local coordinate transformations in configuration spacetime, the general covariance of the formalism of Lagrange is discussed. Next, the group of Lagrange (for all n-dimensional Lagrangian systems) is introduced, and some important features of this group, as well as of its action on the set of Lagrangians, are briefly examined. Only finite local transformations of coordinates are considered here, and no variational transformation of the action is required in this study. Some miscellaneous examples of the formalism are included.

Keywords

Covariance, Field Theory, Elementary Particle, Quantum Field Theory, Coordinate Transformation