

ASTRODYNAMICS SYMPOSIUM (C1)  
Orbital Dynamics (1) (2)

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## SURVEY OF RESEARCH ON LAMBERT'S PROBLEM

**Abstract**

The problem of determining an orbit with specified initial and terminal position vectors and specified transfer time is usually called Lambert's problem. Lambert's problem is a two-point boundary value problem (TPBVP) in astrodynamics, plays an important role in navigation, guidance, etc., and has attracted great attention for more than 200 years. Two-body Lambert's problem was briefly surveyed in the introduction part of some papers. However, there are no published papers which allsidedly summarize Lambert's problem. The purpose of this paper is to conduct a survey of the research on Lambert's problem all round. Firstly, the geometrical properties of Lambert's problem is given and the important transforming invariants are summarized. Secondly, the state-of-the-art for solving Lambert's problem is surveyed in five aspects: the two-body single-revolution solving methods, the two-body multiple-revolution solving methods, the solving methods using Kustaanheimo-Stiefel transformation, the solving methods considering orbit perturbations and the solving methods for restricted three-body orbit model. The main solving methods are compared in terms of universality, convergence efficiency, etc. Then, the engineering applications of Lambert's problem in orbital transfer, orbital rendezvous, orbital interception and the guidance of ballistic missile are surveyed. Finally, the prospect of the research on Lambert's problem is discussed.