

ATELIER
« MOUVEMENTS PLANÉTAIRES, DYNAMIQUE DES SATELLITES ET ORBITES DES ENGIN SPATIAUX »
22–26 JUILLET, 2013

WORKSHOP
“PLANETARY MOTIONS, SATELLITE DYNAMICS, AND SPACESHIP ORBITS”
JULY 22–26, 2013

Intersection of curves and orbit determination

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We review some recent results concerning orbit determination problems which are reduced to the investigation of intersections of algebraic curves. First we show a generalization of Charlier's theory, giving an interpretation of the occurrence of alternative solutions in the computation of preliminary orbits by Gauss' and Laplace's methods. Then we review two recent orbit determination methods, useful for the linkage of two short arcs of observations. Here the integrals of the two-body motion are used to write polynomial equations for preliminary orbits. We also show some applications of these methods to real data of asteroids and space debris.

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