# Asteroid identification with the Keplerian integrals

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The orbit determination problem, nowadays, has to deal with a great amount of very short arcs coming from the modern surveys. From them one can compute the angular positions and velocities of the object at a mean time, giving the so-called attributables.

We consider the problem of linking two different attributables to form a preliminary orbit. If the time interval between two such arcs is large, then this linkage operation is difficult. Moreover, the computational complexity required to scan all the possible couples can be too big. For these reasons there is a huge database of observations without corresponding orbits, or whose orbits are very uncertain.

Gronchi et al. [1,2] proposed an algorithm to solve efficiently these problems. Using the Keplerian integrals and some algebraic reductions, the problem is reduced to just one polynomial equation. This method produces preliminary orbits endowed with covariance matrices. Alternative solutions can occur and also false orbits can be introduced. So, after eliminating the false solutions, a criterium on the covariance matrices of the admissible orbits is introduced to get the acceptable solution.

This method has a strong theoretical base but the implementation has only been tested in particular cases using simulated data. In this talk we will consider the application of the algorithm to real data on a large scale. The algorithm seems to be useful when dealing with arcs that do not present a significant curvature. Moreover, the great amount of data requires the choice of some criteria of selection of the couples to test. We will present the results and compare them with some other methods.

**References:** [1] Gronchi G.F., Dimare L., Milani A. (2010). Orbit determination with the two body integrals. Celset. Mech. Dyn. Astron. 107, 299–318. [2] Gronchi G.F., D. Farnocchia, Dimare L. (2011). Orbit determination with the two body integrals. II. Celset. Mech. Dyn. Astron. 110, 257–270.