



## **Preliminary Orbit Determination Using the Gauss and the Double-R Iteration Methods**

M. Mahooti

Tehran, Faculty of Engineering, Geomatics, Islamic Republic Of Iran (meysam.mahooti@gmail.com)

### **Abstract**

In order to obtain orbital elements of a satellite from angular measurements, there are three approaches: Laplace's, Gauss's, and double r-iteration. The Gauss and the double r-iteration techniques are commonly used for practical purposes. These methods use three sets of chronologically ordered gimbal angle measurements from up to three separate tracking stations to determine the Cartesian components of position and velocity. The angle data set can be distributed over an orbital arc of less than 60 degrees in mean anomaly for the Gauss method and up to 360 degrees in mean anomaly for the double d-iteration method. The epoch for the position and velocity corresponds to the time of the second measurement set. The methods are deterministic since the six measurement components yield the six position and velocity components. Description and test of these two approaches with the STK are the aims of this paper.

**Keywords:** Preliminary orbit determination, Gauss method, Double r-iteration method, Angular observations