Short Arc Technique for Baselines Determinations

Authors : Gamal F.Attia

Abstract : The baselines are the distances and lengths of the chords between projections of the positions of the laser stations on the reference ellipsoid. For the satellite geodesy, it is very important to determine the optimal length of orbital arc along which laser measurements are to be carried out. It is clear that for the dynamical methods long arcs (one month or more) are to be used. According to which more errors of modeling of different physical forces such as earth's gravitational field, air drag, solar radiation pressure, and others that may influence the accuracy of the estimation of the satellites position, at the same time the measured errors con be almost completely excluded and high stability in determination of relative coordinate system can be achieved. It is possible to diminish the influence of the errors of modeling by using short-arcs of the satellite orbit (several revolutions or days), but the station's coordinates estimated by different arcs con differ from each other by a larger quantity than statistical zero. Under the semidynamical 'short arc' method one or several passes of the satellite in one of simultaneous visibility from both ends of the chord is known and the estimated parameter in this case is the length of the chord. The comparison of the same baselines calculated with long and short arcs methods shows a good agreement and even speaks in favor of the last one. In this paper the Short Arc technique has been explained and 3 baselines have been determined using the 'short arc' method.

Keywords : baselines, short arc, dynamical, gravitational field