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# Asteroid masses with Gaia from ground and space-based observations

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Determination of masses of large asteroids is one of the expected scientific outputs from the future Gaia astrometric space mission. With the exception of binary asteroids or fly-by with a space probe, the error in mass determination depends on the size of perturbation effect produced on the motion of small asteroids. Considering the 5 years nominal duration of the Gaia mission, there will be mutual close encounters between asteroids occurring either close to the beginning or to the end of the mission. So that the maximum of deflection angle pertained to the perturbation maxima will not be observed directly by Gaia. Since astrometric data of the perturbed body before and after the encounter are mandatory to derive a perturber mass, the precision of mass determinations based solely on the Gaia observations will deteriorate in such cases. The possible way out consists in acquiring ground-based observations of high astrometric precision in time either before or after the Gaia operations, as it was suggested in [1]. By adding such data, it is expected to increase the number of derived asteroids masses [2].
This paper updates earlier predictions of encounters of large asteroids with smaller ones, e.g. [3], in terms of newly discovered asteroids and available ground-based observations. The method used consists in the computation of the offsets in right ascension and declination between the unperturbed and perturbed solutions fitted to the available observations for each small (perturbed) asteroid. For the purpose of decreasing CPU time, a special filter was applied based on the solution of the two-body problem and systematical search for close encounters, e.g. less than 0.1 A.U., of all known asteroids with the large (perturber) ones. The obtained list of asteroids-candidates was used as the input file for the mentioned above accurate calculations. Such a procedure was used for a few asteroids in [2]. The maximum visible offset corresponds to the dates when the complementary ground-based observations will be useful.
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