

# Determination of masses of six asteroids from close asteroid-asteroid encounters

Grzegorz Michalak<sup>1</sup>

<sup>1</sup>*Wrocław University Observatory,  
Kopernika 11, 51-622 Wrocław, Poland. E-mail: michalak@astro.uni.wroc.pl*

New masses of six asteroids: (10) Hygiea, (52) Europa, (511) Davida, (704) Interamnia, (15) Eunomia and (6) Hebe, were determined. The masses were calculated by means of the least-squares method as weighted means of the values found separately from the perturbations on several single asteroids. As a result of the extensive search for large asteroidal perturbations exerted by over two hundred most massive asteroids on 4500 numbered minor planets, the encounters suitable for mass determination were selected. Most of them were never used before for this purpose. The masses of Hygiea, Europa, Interamnia, Davida, Eunomia, and Hebe were determined from perturbations on respectively 8, 4, 3, 3, 3, and 2 asteroids. The masses of Europa, Davida and Hebe were calculated for the first time. Special attention was paid to the selection of the observations of the asteroids. For this purpose, a criterion based on the requirement that the post-selection distribution of the  $(O - C)$  residuals should be Gaussian was implemented. As an outcome of the search for possible perturbers among 799 brightest asteroids, for all asteroids under consideration, correct dynamical models, including important perturbers, were proposed. The masses presented in this paper were obtained within the ongoing Asteroid Mass Determination Program, started in 1998 in the Wrocław University Observatory, Poland. So far, the program gave reliable mass estimates for the three largest asteroids: (1) Ceres, (2) Pallas and (4) Vesta (Michalak 2000).