

PROPER ELEMENTS OF MINOR PLANETS

ZORAN KNEŽEVIĆ

Astronomical Observatory, Volgina 7, 11050 Belgrade

Abstract. Theories and methods for the determination of minor planets proper elements, that serve as parameters for identification of minor planet families, are reviewed. The four most important past contributions (Hirayama, Brouwer, Williams, Kozai), and the five contemporary ones (Milani and Knežević for low to moderate eccentricity/ inclination main belt objects, Lemaitre and Morbidelli for high e, i objects, Milani for Trojans, Schubart for Hildas, and Morbidelli for the secular resonant objects) are discussed and compared. The most significant recent improvements are described, in particular those regarding the analytic and the semianalytic solutions. Some common misunderstandings about proper elements, their definition and use, are briefly mentioned and clarified. The dynamical structure of the minor planet belt, as determined by the low order mean motion resonances and by linear and some nonlinear secular resonances, is considered from the point of view of the accuracy of computation of proper elements and of the reliability of identification of minor planet families.