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Editorial

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This special issue of Celestial Mechanics and Dynamical Astronomy features 13 selected papers on "New Trends in Astrodynamics and Applications". It is dedicated to a new approach to Astrodynamics, bridging the gap between this field and Dynamical Systems, Celestial Mechanics, and Dynamical Astronomy. One of the main applications is new low energy pathways using invariant manifolds and weak stability boundaries for solving problems of space flight involving fuel efficient ways to move from the Earth to the Moon, Mars, asteroids, and beyond. In these applications, the dynamics of halo orbits and ballistic capture are considered. These dynamics are applied in a number of situations including chemical rockets, solar sails, low thrust, and formation flying, as well as to the motions of asteroids and comets. Also considered are global optimization, numerical methods, advanced algorithms, advanced methods of guidance and control, and mathematical topics such as hyperbolic invariant sets, heteroclinic and homoclinic connections. The use of dynamical systems has played an important role in understanding how trajectories can move in a low energy fashion between the mass points in the three- and four-body problems. This has provided new practical routes for spacecraft that have been applied to a number of missions to the Moon and Lagrange points, and is planned to be used in the future. It has also given insights into the topics in Astronomy ranging from the motions of asteroids and comets to the origin of the Moon. Insights have also been obtained into the general dynamics of chaotic motions in three-body problem.

The editors thank the organizers of New Trends in Astrodynamics and Applications V, for conveying to the speakers our invitation to submit their original papers to Celestial Mechanics and Dynamical Astronomy for this special issue. The journal editorial board is acknowledged

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for the competent handling of the papers so that all accepted papers could be timely revised for inclusion in this issue.

This is the first time in recent times that this journal has one Special Issue fully devoted to Astrodynamics and Applications with a set of papers that is hoped the readers may find useful. E.B. acknowledges the support of NASA, ESA and the Politecnico di Milano to this initiative.