Navigating Chaos:
Applications of Dynamical Systems Theory to
Astrodynamics and Celestial Mechanics

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Spacecraft technology is currently in the midst of significant advance, driven by the miniaturization of satellites, interest in on-orbit servicing, and demonstrated success in robotic exploration. Continued innovation in spacecraft technologies demands the design of trajectories for spacecraft that require fewer resources, possess longer lifetimes, and visit farther destinations. By actively leveraging structures such as periodic orbits, quasi-periodic orbits and manifolds, techniques from dynamical systems theory can facilitate the design of complex paths within cislunar and interplanetary space. Many techniques employed in trajectory design are also useful in modeling natural celestial transport within various systems, providing further information about the formation and evolution of the universe. As summarized during this talk, progress in the study of multi-body dynamical environments facilitates advances in both astrodynamics and celestial mechanics, while also supporting new and exciting missions for individual spacecraft and distributed systems.