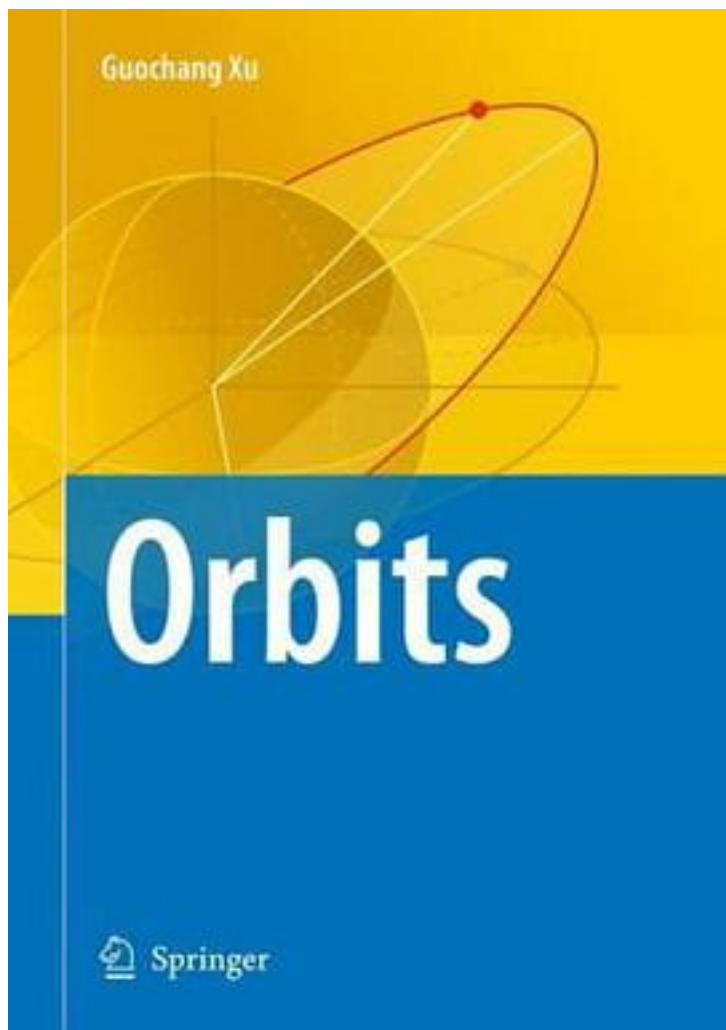# Orbits

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This is the first reference and handbook since the satellite era began, which describes

and derives systematically the orbit theory with analytical solutions of the equations of satellite motion, with respect to all of the extraterrestrial and geopotential disturbances of the second order.The equations of satellite motion perturbed by extraterrestrial disturbances are solved by means of discretization and approximated potential functions as well as Gaussian equations. The equations perturbed by geopotential disturbances are solved by using symbolic mathematical operations. The traditional problem of singularity in the solutions is solved by so-called singularity-free theory. Simplified disturbed equations of motion are proposed to simplify the solutions. Applications of the theory for analytic orbit determination are discussed. The contents cover the complete orbit theory and the analytic solutions of the disturbed satellite orbits as well as their applications.Based on such theory, the algorithms of orbit determination can be greatly renewed; deeper insight into the physics of disturbances becomes possible; the way to a variety of new applications and refinements is opened.

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