

Celestial Mechanics – Exercises

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Unit 1: Introduction

Problem 1.1

The surface where the magnitudes of the gravitational forces from the Earth and the Sun are equal is called the gravitational sphere of the Earth with respect to the Sun. Is this surface really a sphere? For which mass of the Earth would the gravitational sphere be a plane?

(2 points)

Problem 1.2

(a) Find the attracting force of a uniform, infinitely thin disk with radius R and surface mass density (mass per area) Σ . For simplicity, only consider the case where a test particle is located on a line passing through the disk center, perpendicularly to the disk plane.

(2 points)

(b) Find an approximate expression for that force for the case when the test particle is close to the disk ($|x| \ll R$, where x is the normal distance to the disk).

(+1 point)

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