

Celestial Mechanics – Exercises

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Unit 5

Problem 5.1

Which form do the zero-velocity surfaces take in the *two-body* problem? What type of orbit does the body have if it touches the zero-velocity surface?

(2 point)

Problem 5.2

Find the value of the Jacobi constant C (for $v = 0$) at the geometric center of M_1 and M_2 . (*Hint: Remember that, in our units, $GM_1 = 1 - \mu$, $GM_2 = \mu$ and $a = 1$.*)

(2 points)

Bonus Problem 5.3

Write a computer program/script to calculate and plot the zero-velocity surfaces (of the restricted three-body problem) for various values of the Jacobi constant.

(+2 points)

Bonus Problem 5.4

Find a second integral of motion of the restricted circular three-body problem.

(+Nobel Prize in Physics)

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