Computational Physics II Homework 2 Due Tuesday, April 24

Describe in detail your procedure for solving the following problems. For problem 2, you are required to write a computer program. For problem 3, you are only required to provide a flow chart describing the structure of your program. Problem 4 is for extra credit. As before, send a copy of your source code to mailbox ruc\_phys\_guo@163.com

Problem 1 (20 points)

The Numerov algorithm is described in Eq. (4.76) with the coefficients given by Eqs. (4.87) - (4.90). Derive the Numerov algorithm.

Problem 2 (60 points) (part (b) of problem 7.9 in the textbook)

The equation of motion for the problem is given in part (a). Use the relaxation method to calculate the displacement of the rope when it is at equilibrium. What is the maximum displacement of the rope? You need to submit a copy of your source code along with a plot of the displacement along the rope. (Note: at equilibrium, the displacement is time independent. This problem is similar to the example bench problem except now there are two people sitting on the rope.)

Problem 3 (20 points)(a revised version of Problem 7.4 in the textbook)

Derive the relaxation scheme for solving the three-dimensional Poisson equation

The system has a rectangular geometry with constant potential at the boundaries.

Problem 4 (30 points extra credit)（Problem 4.13 in the textbook）



Note:

The bisection method for root finding is described on page 62 of the textbook.