

Homework set # 4. Assigned Jan. 31, due Feb. 9.

1. Consider a particle moving in a Morse potential. Solve using the Runge-Kutta method for the position and velocity as a function of  $t$ , with the initial condition with the oscillator stretched about 10% beyond  $R_e$  as well as it stretched about 50% beyond  $R_e$ , and with the initial velocity = 0. See <http://jchemed.chem.wisc.edu/JCEDLib/SymMath/collection/007/FTAnharm.pdf> If you prefer, you can use the distances described in this article. Describe how your results differ with the amount you stretch the bond and provide an explanation.
2. Does the differential equation analog of the logistic may show periodic doubling as the rate constant  $a$  is varied and extreme sensitivity to the initial value of  $x$ , for some values of  $a$ ? Discuss your results.