

PHY-421: Mechanics, UMass Amherst, Problem Set #10

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Due: Friday, Nov 20 before 6pm. (Late homework will not be accepted.)

I. ANHARMONIC OSCILLATOR

Consider a one-dimensional system with a generalized coordinate $x(t)$ described by the Lagrangian

$$L = \frac{1}{2}m\dot{x}^2 - \frac{1}{2}m\omega^2x^2 - kx^4 - \alpha x^2\dot{x}^2.$$

Write down the Hamiltonian for this system, and compute the equation of motion from Hamilton's equations. Compare your result with the Euler-Lagrange equation for this Lagrangian.