Physics Problems
Problem #1

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Normal Modes in 1D[1]

a. Discrete

Consider a system of N particles which is subject to a restoring force proportional to the separation to the equilibrium position ($F \quad \alpha \quad x$). How many normal modes has this system?

b. Continuous

Consider now a continuous system of particles confined to a length L and fixed borders. Which are normal wave lengths (λ_n) and the normal frequencies (ν_n) in terms of ν(the speed of waves in the medium)? Is it correct to think that this system has infinite normal modes?. If it does not have infinite normal modes, give a order of magnitude of the number of normal modes.

[1] A. P. French. Vibrations and Waves. 2003