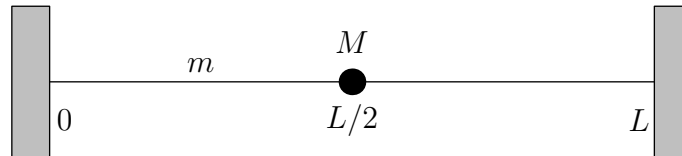


M02M.2—Mass on a String

Problem

A string of length L , mass m , and tension τ is fixed at the two extremes. A mass M is attached in the middle, as shown in the figure. The string oscillates transversely in the plane of the figure.



- Write down the form of the normal modes and the equations that determine their frequencies.
- Show that the equations you derived have a family of solutions where the mass M is always at rest.
- List the normal mode frequencies at $M = 0$ and $M = \infty$.
- Sketch how the first four frequencies interpolate between these limits.