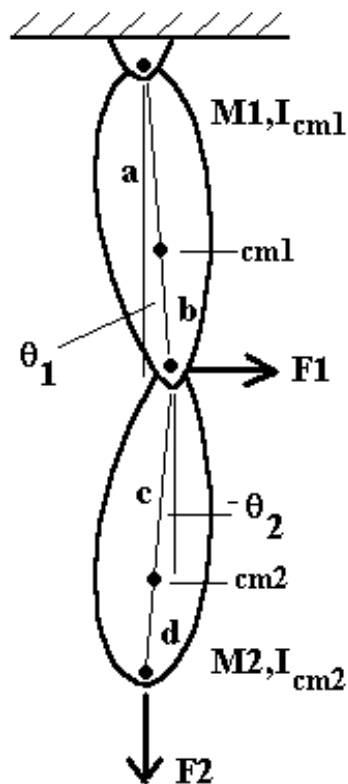


**PROBLEM 1:** (40%)

Derive the equations of motion for the double compound pendulum below using Lagrange's method. Be sure to derive the generalized forces corresponding to each generalized coordinate.



**PROBLEM 2:** (35%)

Linearize the EOMs from Problem 1. You can either linearize the EOMs or go back to your potential and kinetic energy expressions and re-derive your linearized EOMs from there.

**PROBLEM 3** (25%)

Derive the linearized equations of motion for the system below in two ways: 1) derive the EOMs using Lagrange’s approach and then linearize the equations; and 2) derive the linearized EOMs directly using only the relevant terms in Lagrange’s approach.

