Generalized double pendulum problem

Given each of the l^{th} of n equations as follows

$$\sum_{i=l}^{n}\sum_{j=1}^{i} m_i l_l l_j \cos(\theta_j - \theta_l)\ddot{\theta}_j = \sum_{i=l}^{n}\sum_{j=1}^{i} m_i l_l l_j \dot{\theta}_j^{\,2} \sin(\theta_j - \theta_l) - \left[\sum_{i=l}^{n} m_i\right] l_l g \sin(\theta_l)$$

Code a solution for the motion of "n" coupled pendulums, assuming that the equations represent pendulums linked end to end (i.e. the second pendulum is hanging from the end of the first), each of which is made up of a thin, rigid, nearly massless rod of length l_l and a bob at the end of mass m_l, and that the pendulum has been constructed so that each pendulum can swing a full 360 degrees without interacting with any other.

Analyze your solution and determine the amount of initial energy in the system required to produce chaotic behavior for a chain of 1000 pendulums. Include in your answer visualizations of the motion of your system.