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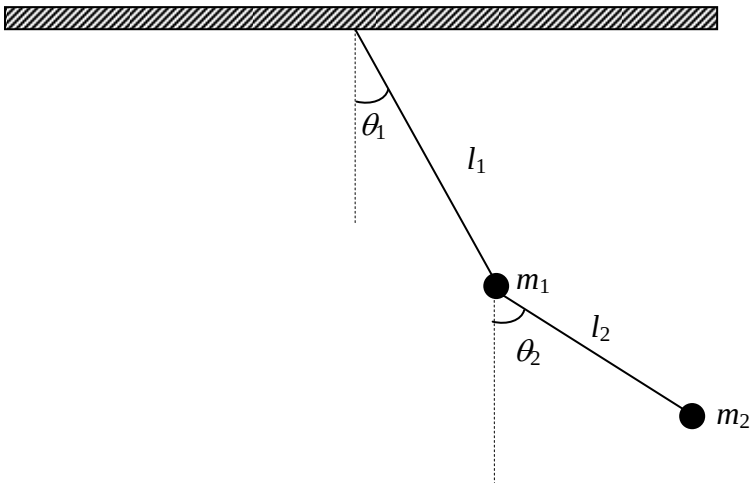
KTH Mekanik

Läsåret 05/06

5C1106 Tillämpad fysik, mekanik, 4 poäng (6 ECTS)

Projekt: Dubbelpendeln



The double pendulum is the simplest dynamical system which may show chaotic behavior. In traditional education this real behavior of the double pendulum is often neglected since one immediately linearizes the equation of motions (Maclaurin expansion of the trigonometric functions and only keeping the zeroth and first order terms).

Significant for the chaotic behavior is that the movement will not be periodic and it also extremely sensitive for the initial conditions.

1. Find out as much as possible about the simple double pendulum (two particles connected by an inflexible light string and one of the particles connected to a fixed point by another inflexible light string).

2. Derive its equations of motions (two coupled differential equations).

3. Consider under what conditions they may be linearized.

4. Demonstrate the pendula behavior with a physical model and/or a computer animation (I have software to lend you, which simplifies the programming work).

5. If there is time, discuss also some about “normal coordinates”.