

Systems of Oscillators with Piecewise Constant Coupling

Nathan Breitsch

Today

1 Introduction: Dynamical Systems and Oscillators

1.1 A

dynamical system is a useful framework for thinking about any object in the platonic universe. This framework equips us with the following: -a way to represent all relevant attributes (collectively called the state) of the object -a rule for determining all future states from an initial state

To make this idea more concrete, consider as an object a single body moving through space. The state of the object may be captured by six numbers: three to represent the body's position and three to represent the body's velocity. Given an initial velocity,

(periodic orbit) If we know the state of a system at any initial time t_0 , the rule for evolution allows us to determine uniquely the state of the system for all future times. Sometimes the state of a system comes back to its starting place. When this happens, the object will continue its behavior between t_0 and t_1 repetitively forever.

(define oscillator) An oscillator is any system which behaves repetitively. The period T of an oscillator is the amount time it takes to perform a single "lap." At any time t , we define the phase of the oscillator $\phi(t)$ to be the progress of the oscillator through the current cycle.

find a good book and do all the fucking definitions from there. Right now not worth your time.

(examples and properties of oscillators) eventually get to phase reduction:

$$\frac{d\phi}{dt} = \omega$$

(coupling of oscillators)