

PHYS3710 Short experimental projects I
Department of Physics
The Chinese University of Hong Kong, Hong Kong
Topic: Coupled oscillator

designed by
H.K. Wong, March 24, 2004

Topics you should know first:

1. Coupled oscillator

Objectives:

1. Verify the theory for a coupled oscillator with arbitrary initial condition using electrical circuit.
2. Observe normal modes and determine their frequencies.

Check-list for the project:

1. Review theory for coupled oscillator (Ref. 1) and read Ref. 2.
2. ***Symmetric coupled oscillator:*** $C_1 = C_0 = C_2$
 - a. You will be provided some capacitors and inductors. Measure their capacitance C and inductance L .
 - b. Set up a symmetric coupled oscillator circuit as described in Ref. 2.
 - c. Record the voltages across the capacitors using a storage oscilloscope.
 - d. Fit data with two sinusoidal waves and determine the normal mode frequencies. Study coupling strength and energy transfer as a function of C_0 as described in Ref. 2.
 - e. Compare results with theory.
3. ***Asymmetric coupled oscillator:*** $C_1 \neq C_2$
 - a. Repeat step 2.
 - b. Compare results with theory.

References:

1. K.R. Symon, “***Mechanics***”, 3rd ed., pp. 191-197. (QC125.S98 1971)
2. F.N. Yan, S.T. Yip and H.K. Wong, “Experiments on a coupled oscillator”, IEEE Transaction on Education, Vol. 39, pp.558-562 (1996).*

* available on CoursePage.