LAB 3 THEORY

Mutually coupled inductors.

Two inductors have a mutual connection if the magnetic field, created by one of them, goes through the cross section of the other one. Schematically the mutual coupling is presented as shown in fig. 1.

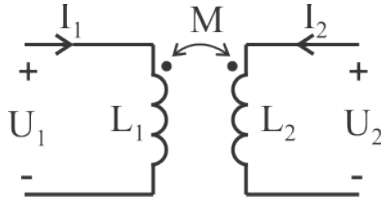

Fig. 1.

The coupling between the mutual inductance M , and the two inductors L_1 and L_2 is determined according to:

$$M = k . \sqrt{L_1 . L_2}$$

where k is the coupling coefficient, which takes values from 0 (the two inductors are not mutually coupled) and 1 (for ideally coupled inductors). In real situations the coupling coefficient can never reach 1.

If through inductor L_1 flows AC current, the voltage drop caused by the self induction is:

$$u_{L1} = L_1 . \frac{di_1}{dt}$$

And the induced voltage drop on L_1 , caused by L_2 , is:

$$u_M = M . \frac{di_2}{dt}$$

In case of sinusoidal currents and voltages, the above dependencies couple be presented in complex form:

$$\dot{U}_{L1} = j\omega L_1 . \dot{I}_1$$

$$\dot{U}_M = j\omega M . \dot{I}_2$$