A coffee can mounted on needle bearings is placed under a coil. A second coil is placed perpendicular to the first coil. Both coils are connected to the same variac. The phase difference between the fields of the two coils causes the can to rotate, thus creating a simple induction motor.

**Coffee Rotation in a "B" Field**

Coil 1 (on block)
L=55.7mH @120Hz
(DC) R=1.8W

\[ w = 2pf = 2p(60Hz) = 376.99\text{rad/s} \]

\[ q = \tan^{-1} \left( \frac{wL}{R} \right) = \tan^{-1} \left( \frac{11.67}{55.7} \right) = 85.10^\circ \]

Coil 2
L=1.29mH @120Hz
(DC) R=.9W

\[ w = 2pf = 2p(60Hz) = 376.99\text{rad/s} \]

\[ q = \tan^{-1} \left( \frac{wL}{R} \right) = \tan^{-1} \left( \frac{5.40}{1.29} \right) = 28.38^\circ \]

4/17/01
A coffee can mounted on needle bearings is placed under a coil. A second coil is placed perpendicular to the first coil. Both coils are connected to the same variac. The phase difference between the fields of the two coils causes the can to rotate, thus creating a simple induction motor.

Ref: hb x87; w/ tape 4-04:12:55
MAGNETIC & ELECTROMAGNETIC INDUCTION - Electric Motors

A coffee can, suspended on an axle along its symmetry axis, spins in response to a rotating magnetic field.

Equipment:
- Coffee can suspended on axle
- Variac
- Thin wire coil (same as for levitating coil)
- Heavy coil (about same size as above coil)
- Plexiglass (Plastic) L-Shape to hold light coil
- Length of wood to place under heavy coil

Set Up:
- Turn off variac. Arrange coils as in photo.
- Plug both coils into variac, plug variac into 110V/60HZ
- Turn on variac and increase the voltage. The coffee can should spin

The light coil will become quite warm after just a few minutes of applied voltage.

X87. Coffee-can Induction Motor; Two Coils out of Phase; 60 Hz. - 10F
Purpose: Another example of the induction motor where rotating field arises from differing phase shifts in 2 coils.

Equipment: Coffee-can motor. "Maxwell House" can mounted on shaft about its axis: two coils with markedly different values of L/R ratio; variac and 120V 60 Hz supply.

Procedure:
- Both coils driven with same AC (60 Hz) supply
- Coils oriented at right angles to each other (see sketch)
  - Thin-wire coil has fewer turns and significant R; so \( \tan \phi = \omega L/R < 1 \)
  - Thick wire coil has more turns and small (?)R; so \( \tan \phi = \omega L/R > 1 \)
- These phase shifts yield a rotating B field as can be seen (explain with diagrams.)
- The induced mag. mom. in the can causes can to follow B field

Inductances, resistances, # turns, wire size, and radii of each coil should be measured and indicated on labels

Ref: V4. video V54; tape 4 item 5 of 14.
COFFEE CAN SHOULD BE CHANGED TO 'MAXWELL HOUSE' BRAND; THIS IS A SERIOUS SUGGESTION, NOT A JOKE. WHOEVER HEARD OF 'CHOCK-FULL-OF-NUTS' EQUATIONS?