Magnetic Braking I – Damped Pendulums

Apparatus

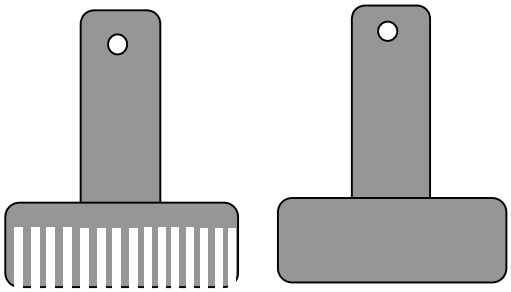
large horseshoe magnet or pair of magnets, pendulums made from complete and incomplete metal loops, pendulums made from complete sheets of aluminium or copper, and from sheets with slits

Action

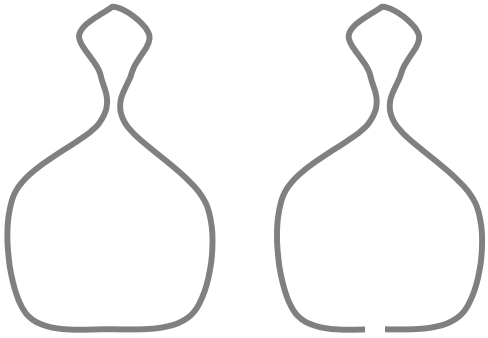
The students allow the different pendulums to swing between the magnetic poles and observe which ones are braked and which ones are not. They should try to predict in advance how the pendulums will behave and then compare their observations to their predictions.

The Physics

In all cases extensive swirls of currents, eddy currents, are induced in sheets and loops without slits and not in sheets or loops with slits. The induced currents experience a force due to the magnetic field from the magnets, which produces a force on the pendulum opposing the motion that causes them, braking the pendulums without slits.



Some simple pendulum designs



Students at the University of Sydney experimenting with a simple loop style pendulum in a magnetic field.

Accompanying sheet

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Which pendulums will swing freely and which will be damped by the magnetic field?

Try the different pendulums and see what happens.

Explain your observations.
Were your predications correct?