Mohawk Valley Library System

SCIENCE @ THE LIBRARY

EDDY CURRENT EXPERIMENT

To show a magnet falls more slowly than a similar size piece of steel through a metallic copper tube. When a magnet is dropped down a metallic tube, the changing magnetic field created by the falling magnet pushes electrons in the metal tube around in circular, eddy-like currents. These eddy currents have their own magnetic field that opposes the fall of the magnet. The steel plug will fall through the copper tube at the same rate it would on a free fall. The magnet falls dramatically slower through the copper tube than it does in ordinary free fall.

MATERIALS INCLUDED:

2 Plugs which look identical, but one is steel and one Neodymium magnet
1 Copper Tube with 2 yellow end caps for storage

WHAT TO DO:

Take the yellow end caps off the copper tube and tip out the two identical plugs, which will be sticking together.

First "free fall" the plugs, holding one in each hand, drop them simultaneously from the same height over a soft surface. Do they take the same time falling? (They should.)

Now, hold the tube over a soft surface or hand and drop one of the plugs down the tube (or have someone else drop it down).

Repeat with the other plug.

Was one slower than the other? Which one?

Try dropping the faster one (the steel) through the tube, while simultaneously dropping the magnet near the tube in a free fall. Is there a difference of speed now? Repeat with the magnet down the tube and the steel outside the tube.

OBSERVATIONS:

As the magnet falls, the magnetic field around it constantly changes position. As the magnet passes through a given portion of the metal tube, this portion of the tube experiences a changing magnetic field, which induces the flow of eddy currents in an electrical conductor, such as the copper or aluminum tubing. The eddy currents create a magnetic field that exerts a force on the falling magnet. The force opposes the magnet's fall. As a result of this magnetic repulsion, the magnet falls much more slowly.

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