Correction:

Today, I have done this experiment with a larger magnet whose magnetic field has much smaller vertical component. But the wire did not move. When I approached the wire to the edge of the magnet where the vertical component is stronger, the wire moved. So, the yesterday's conclusion was wrong: the movement of the wire was due to the the vertical component near the edge but not due to force parallel to current.

I apologize for having posted a wrong result.

However, I think it's useful to keep this post for those who have already read it in order to inform them this correction. It is also good for me to remember this disaster.

Sorry again.

PengKuan

Sliding wire parallel action experiment

Peng Kuan 彭寬 *titang78@gmail.com*

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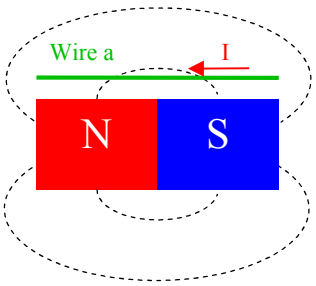
Parallel action is a magnetic force parallel to current. This force is shown in the experiments Disc magnet parallel action experiment and Earth's magnetic field and parallel action on a square coil. A sliding wire moving parallel to its current would show directly this action at work. Here is the video of my experiment on youtube: http://youtu.be/TljaVlJqnCs

1. Experiment

Explanation of the video.

1. The T-wire and the magnet. The magnet's poles are indicated by the orange-white sticker.
2. The T-wire has 3 parts: a, b and c. wire-a: contact wire, wire-b: straight wire, wire-c: mechanical constraint keeping the wire stable.
3. Current flows from wire-a to wire-b without passing through wire-c.
4. When the current is on, the T-wire moves parallel to wire-b's current.
5. View from another angle.
6. Over the magnet wire-b feels a downward Lorentz force. Notice that wire-b is pressed against the magnet. So, Lorentz force cannot push the wire horizontally.
7. Wire-a feels no force because it is parallel to the horizontal component of the magnetic field and the effect of the weak vertical component cancels (see Figure).

2. Conclusion



As wire-a's current feels no force and the T-wire moves parallel to wire-b, the magnetic force on wire-b is parallel to current.

3. Comment

Why the current must pass through wire-a and wire-b that are perpendicular? Because wire-b alone does not move. My explanation is that the magnetic force is a momentum carried by current and if it enters directly into the magnet, the momentum will be transferred to the magnet but to the wire. Wire-a serves to receive this momentum and convert it into the movement of the T-wire.