

## Homework 19

### Magnetism

We started discussing magnetism. Even long time ago people knew the property of some natural magnetic materials. In our everyday life natural and artificial magnets have numerous applications. What are the basic properties of a magnet we can learn from simplest experiments with two magnetic bars?

- a) We can check that the ends of a magnetic bar (we will call them *poles*) have different properties: when you try to get two poles belonging to different bars together you will feel that some poles are attract each other while another pole combination produce repelling force. We can mark them by the characters “N”(north) and “S”(south) in such a way that the attracting poles will be marked by different characters while repelling poles will bear same mark.



- b) Magnetic bars can attract some materials (for example, iron) which are not magnets.
- c) If you cut the bar in the middle you will not obtain two separate poles. Instead, you will have two magnets with both north and south poles.

If electrical current flows in the wire, the wire is “magnetic” – it can be attracted or repelled by a magnet. Based on this experimental fact we can make an assumption that the “*magnetic force*” is *produced by moving charges*. We can introduce magnetic field similarly to how we introduced electric field. As long as in a certain point of space there is a force exerted on a charge moving with respect to the “test magnet” we can say that there is magnetic field in this point.

Later we will learn that both electric and magnetic fields are two sides of one phenomenon.

#### Questions:

1. Does every magnet necessarily have a north and south pole?
2. Suggest a way to make magnetic field “visible”
3. If you bring a magnet close to the screen of old electron beam monitor or TV you will see that the picture on the screen is distorted. Try to explain the effect.
4. You have two rods. One is a magnet, the other made of iron and is not magnetized. You do not know which rod is a magnet. Can you suggest “one touch” experiment which will allow you to determine the magnet rod?