# Obtaining various magnetic fields with a two-dimensional system of currents

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The importance of magnetic fields in modern physics is great, and mankind has known for a long time how a moving charge creates a magnetic field. That is, if we know the coordinates and velocities of charges moving in space or the current density at every point in space, then we can determine what the magnetic field induction is and where it is directed at any point.

The difficulty of analytically solving this problem depends on the system of currents that creates the magnetic field we are looking for, but the way to solve the problem is quite straightforward, and using Bio-Savar's law, even with a numerical method and therefore with a small error associated with it, we can always determine the magnitude and direction of the magnetic field induction at some point.

Here I will try to solve a special case of the inverse problem. The inverse problem involves not finding the magnetic field, but finding the system of currents: magnitudes, directions and locations, to obtain the desired magnetic field. I think the task in this regard has quite a practical content: "Tell us what kind of magnetic field you need and we will find the appropriate arrangement of currents." Unfortunately, we are not able to solve the problem at such a level that we can get the desired $\vec{B}(x, y, z)$ at any $(x, y, z)$ point of the space.

To make the task analytically solvable, we must narrow the search spectrum, thus, as the title tells us, we will consider such a system of currents, which is placed in one plane. We will try to determine what kind of fields we can get and, if possible, analytically find the "backward path", that is, if possible, on the contrary, show the currents by means of a magnetic field.