Biot savart law applications pdf

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Each infinitesmal current element makes a contribution to the magnetic field at point P that is perpendicular to the current element, and perpendicular to the radius vector from the current element to the field point P. The relationship between the contribution of the magnetic field and its current element of origin is called the Biot-Savart law. The direction of the magnetic field contribution follows the illustrated right hand ruler for a straight wire. This direction arises from the nature of the vector product of dependence on electric current. Two French physicists, Jean Baptiste Biot and Felix Savart, derived the mathematical expression of magnetic flux density at one point due to a nearby current transport conductor, in 1820. Seeing the deviation of a magnetic compass needle, two scientists concluded that any current element projects a magnetic field into space. Then, through observations and calculations that had derived a mathematical expression, which shows the magnetic flux density from which dB, is directly proportional to the length of the dl element, current I, the sine of the angle and the or between the direction of the current and the vector joining a given point of the field and the current element and is inversely proportional to the square of the distance of the given point from the current element r. This is the biot Savart statement. The Biot-Savart law gives the magnetic field produced due to a current transport segment. This segment is taken as a vector quantity known as the current element. Consider a cable that carries an i current in a specific direction as shown in the figure above. Take a small element of the wire length ds. The address of this element is along the current one to form a vector identifier. If we want to know the magnetic field produced at one point due to this small element, then we can use the Biot-Savart Act. Let the position vector of the point in question drawn from the current element be r and the angle between the two is . Then the {0} page value of the image page image of the image page image of the page image of the city page page of {2}, dB, sin, sin and {2}. Where, μ_0 - Free space permeability at 4 x 10^{-7} m/A. The direction of the magnetic field is always on a plane perpendicular to the line element and position vector. It is given by the general rule of the right hand where the thumb points to the direction of the conventional current and the other fingers show the directions of the magnetic field. In the figure shown above the direction of the magnetic field you are pointing to the page. This can be expressed in terms of vectors such as: r''r'{2}'' . Let's use this law in an example to calculate the magnetic field because of a cable that carries current in a loop. Example: Current loop magnetic field. Consider an R-radio current loop with a current flowing into it. If we want to the electric field at an l distance from the center of the loop due to a small ds element, we can use the Biot- Savart Act as '('overrightarrow','','frac'"mu""{0}'''''''''''''''{2}''''''''''''''