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Number : 204

For case A:

First: the value of K constant:

$$I = J \,.S$$

$I = 10 * 10^6 * 0.1 * 0.1 \ = 100000\ A$

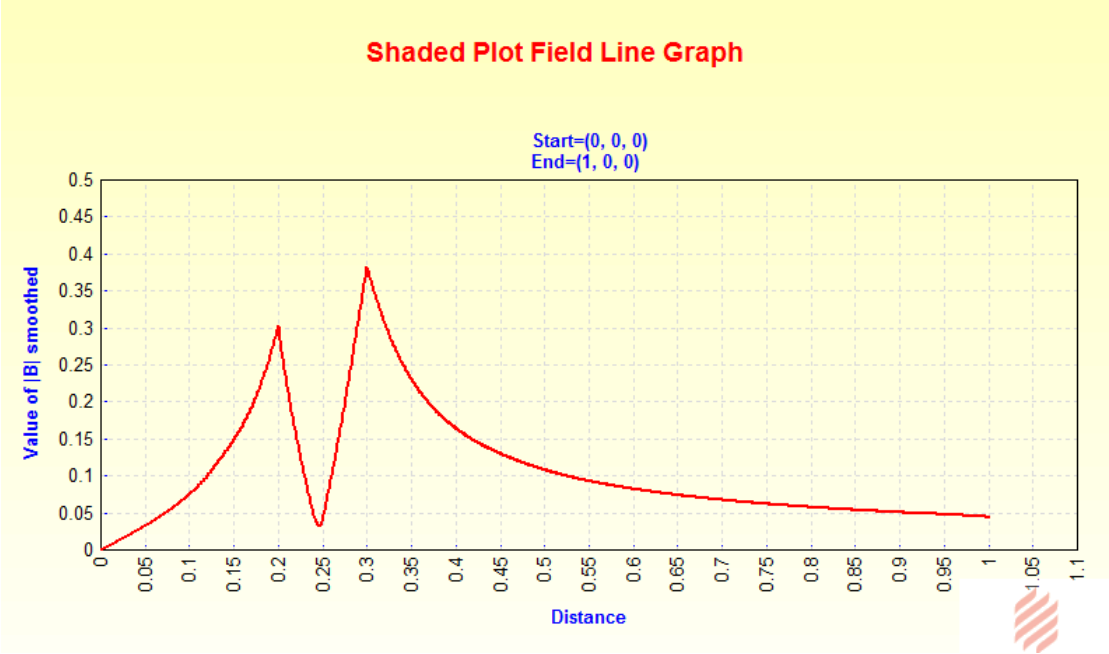
$$F = \frac{2 * 10^{-7}\ K * i_1 *\ i_2}{d}$$

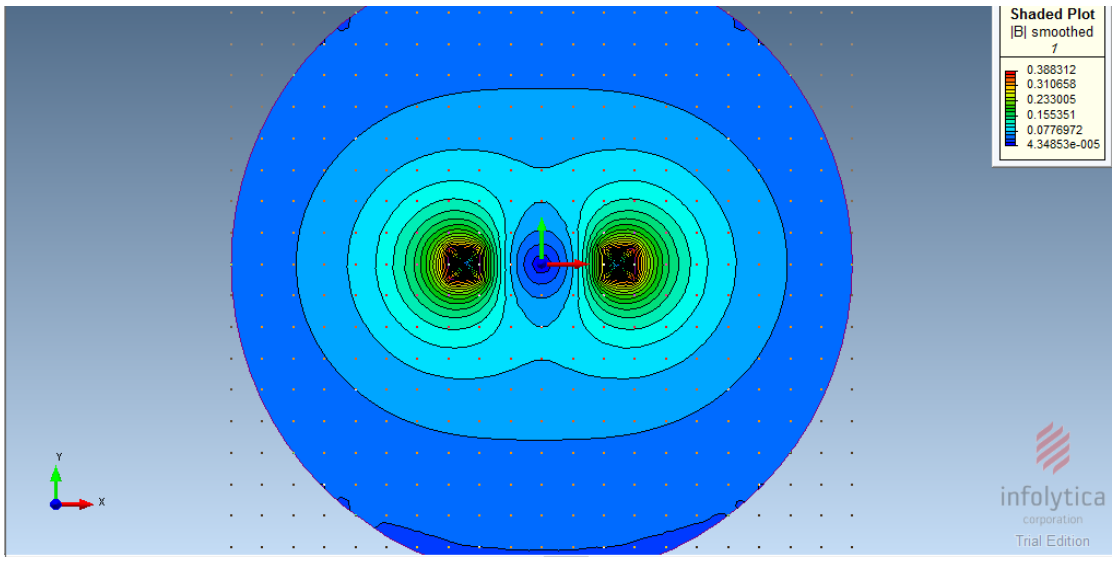
F = $4.06 * 10^3\ N$

$$4.06 * 10^3 = \frac{2 * 10^{-7}\ K * 100000 *\ 100000}{0.5}$$

K = 1.015

Second: the magnetic field density graph for case A:





Comment: As we see in the graph at the point (0,0) the value of B is Zero because the Two bus bars each have a current running in the same direction. And from the Ampere Right Hand Law the electric magnetic density are opposite to each other which make their resultant equal to zero.

For case B:

First: the K constant:

$$I = J \,.\, S$$

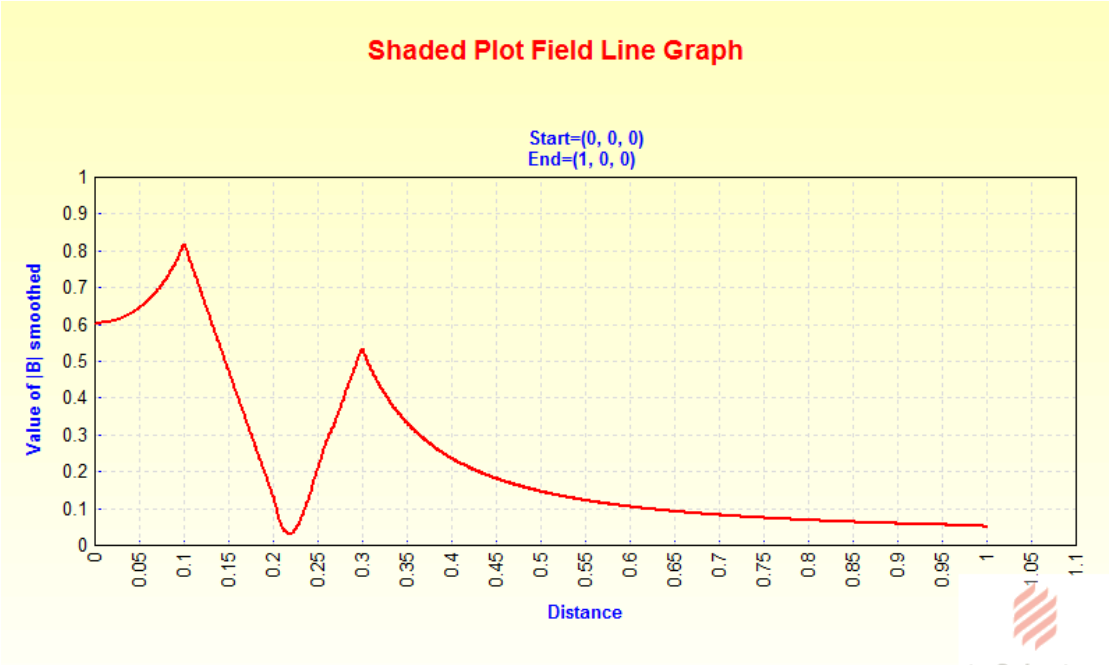
$I = 10 * 10^6 * \pi * 0.1^2 = 314000\ A$

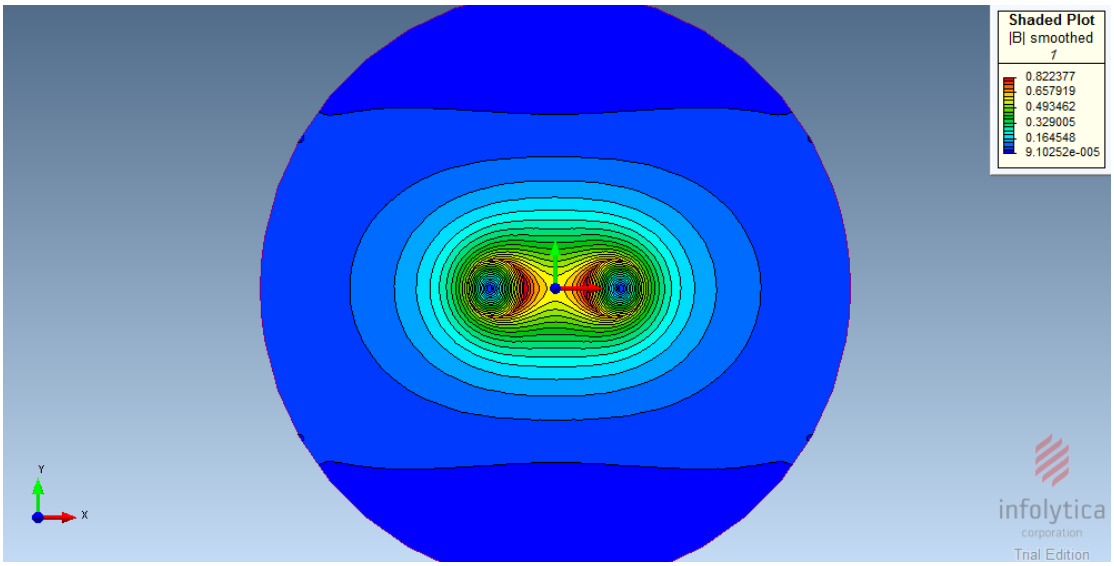
F = $4.13 * 10^4\ N$

$$4.13 * 10^4 = \frac{2 * 10^{-7}\ K * 314000 *\ 314000}{0.4}$$

K = 0.83776

Second: the magnetic field density graph for case B:





Comment: at point (0,0) there is a value for B because the two bus bars with circular cross section each have a current running in the opposite direction. And from the Ampere Right Hand Law the electric magnetic density is in the same direction.