Flux Density Of A Magnet In Distance X

Application Note PE007

For the flux density caused by a round magnet on its magnetic axis the following formula applies:

(1) $$B_x(X) = \frac{B_R}{2}\left[\frac{L+X}{\sqrt{R^2+(L+X)^2}} - \frac{X}{\sqrt{R^2+X^2}}\right]$$

for $X > 0$

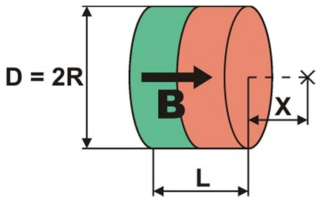

figure 1: round magnet

not valid for AlNiCo500; adopted with kind permission of the company IBS-Magnet in Berlin

Thereby B_R is the remanence of the magnet. It is the residual magnetization of the magnet after it had been magnetized up to saturation.

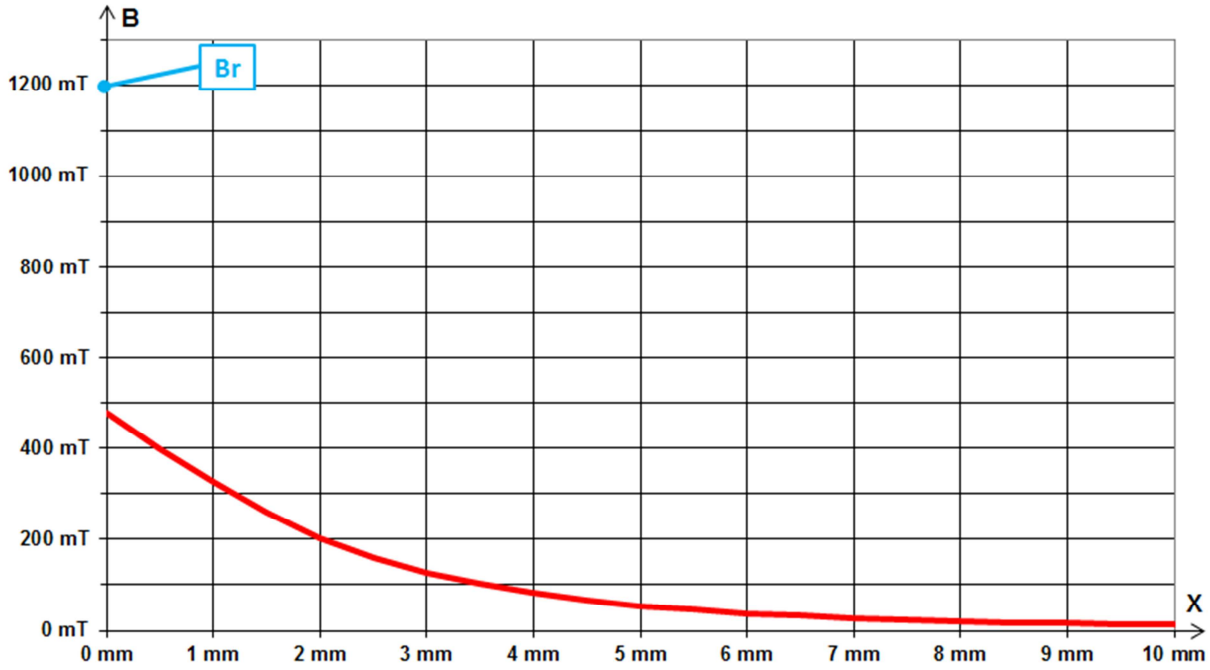

figure 2: flux density course
for D = 2R = 6 mm, L = 4 mm, B_R = 1200 mT (typ. neodymium)

The flux density at the surface is **less than the half** of the remanence and **decreases** with increased distance.

For measurements with magnetic field probes, the distance of the active area to the surface of the probe has to be considered (typ. 0.3…1.0 mm).