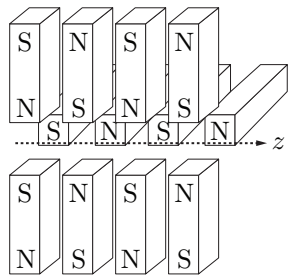
M08E.1 - Wiggler

Problem

A wiggler magnet is constructed of alternating N-S dipole magnets.



An electron beam traveling in vacuum through the magnet in the z-direction and exactly on-axis ($x = 0, y = 0$) is "wiggled" by a magnetic field having components:

$$B_x(0,0,z) = B_0 \cos kz\,,$$
$$B_y(0,0,z) = B_0 \sin kz\,,$$
$$B_z(0,0,z) = 0\,.$$

Compute the off-axis B-field components, $B_x(x,y,z), B_y(x,y,z), B_z(x,y,z)$, within the vacuum region.