Three-Dimensional Field Solutions for Multi-Pole Cylindrical Halbach Arrays in an Axial Orientation (Paperback)

By William K Thompson

Bibliogov, United States, 2013. Paperback. Book Condition: New. 246 x 189 mm. Language: English . Brand New Book ***** Print on Demand *****.This article presents three-dimensional B field solutions for the cylindrical Halbach array in an axial orientation. This arrangement has applications in the design of axial motors and passive axial magnetic bearings and couplers. The analytical model described here assumes ideal magnets with fixed and uniform magnetization. The field component functions are expressed as sums of 2-D definite integrals that are easily computed by a number of mathematical analysis software packages. The analysis is verified with sample calculations and the results are compared to equivalent results from traditional finite-element analysis (FEA). The field solutions are then approximated for use in flux linkage and induced EMF calculations in nearby stator windings by expressing the field variance with angular displacement as pure sinusoidal function whose amplitude depends on radial and axial position. The primary advantage of numerical implementation of the analytical approach presented in the article is that it lends itself more readily to parametric analysis and design tradeoffs than traditional FEA models.

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