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[Flux Coordinates And Magnetic Field](#)

***Flux Coordinates and Magnetic
Field Structure gives a systematic
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mathematical framework and
principles underlying the
description of magnetically
confined fusion plasmas. After a
brief treatment of vector algebra in
curvilinear coordinate systems the***

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book introduces concepts such as flux surfaces, rotational transforms, and magnetic differential equations.

[**Flux Coordinates and Magnetic Field Structure | SpringerLink**](#)

Magnetic coordinates are a particular type of flux coordinates in which the magnetic field lines are straight lines. In mathematical terms this implies that the periodic part of the magnetic field's stream function is zero in these coordinates so the magnetic field reads

[**~p~ger Senes in Computational Physics W D. W.N. G. Hitchon ...**](#)

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confined fusion plasmas. After a
brief treatment of vector algebra in
curvilinear coordinate systems the
book introduces concepts such as
flux surfaces, rotational transforms,
and magnetic differential equations.
The ...*

[Canonical straight field line
magnetic flux coordinates ...](#)

*The magnetic flux (often denoted Φ
or Φ_B) through a surface is the
component of the magnetic field
passing through that surface. In the
most general form, magnetic flux is
defined as $\Phi_B = \iint \mathbf{B} \cdot d\mathbf{A}$ $\Phi_B = \iint \mathbf{A} \cdot d\mathbf{B}$
It is the integral (sum) of*

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all of the magnetic field passing through infinitesimal area elements dA .

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In physics, specifically electromagnetism, the magnetic flux through a surface is the surface integral of the normal component of the magnetic field B over that surface. It is usually denoted Φ or Φ_B . The SI unit of magnetic flux is the weber, and the CGS unit is the maxwell. Magnetic flux is usually measured with a fluxmeter, which contains measuring coils and electronics, that evaluates the change of voltage in the measuring coils to calculate the measurement of magnetic flux.

[11.3: Magnetic Fields and Lines -
Physics LibreTexts](#)

When B is a magnetic field with toroidal nested flux surfaces, two magnetic fluxes can be defined from two corresponding surfaces. The poloidal flux is defined by $\psi = \int_{S_p} \vec{B} \cdot \vec{n} dS$ where S_p is a ring-shaped ribbon stretched between the magnetic axis and the flux surface f .

[16.3: Plane Electromagnetic Waves -
Physics LibreTexts](#)

A magnetic field line can never cross another field line. The magnetic field is unique at every point in space. Magnetic field lines are continuous and unbroken, forming closed loops. Magnetic

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field lines are defined to begin on the north pole of a magnet and terminate on the south pole. Key Terms. B-field: A synonym for the magnetic field.

**[Working in toroidal geometry: *
magnetic flux coordinates ...](#)**

9. Canonical Coordinates or "Generalized Magnetic Coordinates".- 9.1 Flux Coordinates Versus Canonical Coordinates.- 9.2 On the Existence of Flux Surfaces, Revisited.- 9.3 Flux Coordinates.- 9.4 Canonical Coordinates; The Field-Line Hamiltonian.- 9.5 Practical Evaluation of the Field-Line Hamiltonian.- III Selected Topics.- 10.

[Difference Between Magnetic Field](#)

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[and Magnetic Flux](#)

The currents are denoted i_1 and i_2 and the magnetic flux linkage for each is denoted λ_1 and λ_2 , respectively. Assuming for simplification purposes that the slots carrying the coils are negligibly small, the magnetic field intensity H is directed radially and is positive when directed outward and negative when directed inward.

[Toroidal Flux Coordinates / SpringerLink](#)

The magnetic flux Φ is the magnetic flux density which runs through an imagined area. If the field lines run in a straight line (e.g. between the poles of a horseshoe magnet), the magnetic flux Φ through a certain

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*area A which runs vertically to the
flux can be calculated as follows:*

[**What is magnetic flux? \(article\) |
Khan Academy**](#)

*introducing a magnetic flux
coordinate system, for which the
metric tensor can be analytically or
numerically determined once the
magnetic field configuration is
specified [D'haeseleer et al., 1991].
[6] Geomagnetic flux coordinates
include a magnetic field-aligned
coordinate, a radial-like, flux
coordinate that*

[**Chapter 29 - - Magnetic Fields**](#)

*We provide a simple method to
build a straight field-line coordinate
system from discretized (Poincaré)*

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magnetic field maps. The method is suitable for any plasma domain with nested flux surfaces, including magnetic islands. Illustrative examples are shown for tokamak, heliotron, and reversed-field-pinch plasmas with $m = 1$ islands.

[North Magnetic Pole - Wikipedia](#)

CHAPTER 3. STRUCTURE OF MAGNETIC FIELDS 3 configuration. When nested magnetic ψ surfaces exist, they usually provide the most natural magnetic-field-based coordinate system because most plasma processes (charged particle motion, flows, transport) are much more rapid along magnetic field lines and within ψ surfaces than across them.

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[Reconstruction of flux coordinates
from discretized ...](#)

Section 6.4 Calculating Line Elements in Cylindrical and Spherical Coordinates. In the activities below, you will construct the vector differential $\mathbf{d}\mathbf{r}$ in rectangular, cylindrical, and spherical coordinates. These vector differentials are building blocks used to construct multi-dimensional integrals, including flux, surface, and volume integrals.

[Flux tube - Wikipedia](#)

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[Research Magnetic Flux | World of
Physics](#)

*David Griffith's Chapter 2 based on
Example 2-1 Calculating the
Divergence and electric flux of the
Electric Field in Cylindrical
Coordinates for infinite lin...*

[World Magnetic Model - Maps of
Magnetic Elements](#)

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If you want only the magnetic declination (variation) for a single day between 1900-present, visit our declination calculator. If you want all seven magnetic field components for a single day or range of years from 1900-present, please visit our Magnetic Field Calculator. Please read the instructions below before using this calculator.

[Axisymmetric magnetically enhanced discharges described in](#)

...

B is the vector magnetic field, and F is the magnitude or length of B . X , Y , and Z are the three Cartesian components of the field, usually measured with respect to a geographic coordinate system. X is

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northward, Y is eastward, and, completing a right-handed system, Z is vertically down toward the centre of Earth.

[Wave Equation in Cylindrical Coordinates](#)

1. The electric field in space is given in cylindrical coordinates as $E(r) \sin p \sin p + 2p + 42$ V/m, While the magnetic flux density is given in spherical coordinates by $B''(r) - 03p^2 \sin^2$ T. Find the angle between the two vectors at the point $P(1,2,3)$ (rectangular). (Hint: convert both vectors to rectangular coordinates and use the dot product) 2.

[Glossary of Magnet Terms | Dura Magnetics USA](#)

***The Gradient in Curvilinear
Coordinates; 10 Electric Fields. The
Geometry of the Gradient; Using
Technology to Visualize the
Gradient; ... The Magnetic Field of a
Straight Wire; Activity: Magnetic
Field of a Spinning Ring; ... the flux
of this electric field through a
sphere centered at the origin is***

**[Tokamak MHD equilibrium - Book
chapter - IOPscience](#)**

***By definition, McIlwain's (1961) L-
parameter for a dipole field is the
radial distance of the intersection of
the field line with the magnetic
equator; (Note: this is not true for a
real field, where L is defined by
means of a function of the adiabatic
integral invariant I). In this definition
of L, McIlwain used the value***

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*0.311653 gauss R E for M.. B is the
magnetic field strength,
determining ...*

[Q-Maps - Helioseismic and Magnetic Imager for SDO](#)

*A magnetic field strength of 1
ampere/meter is produced at the
center of a single circular
conductor with a one meter
diameter carrying a steady current
of 1 ampere. The number of
magnetic lines of force cutting
through a plane of a given area at a
right angle is known as the
magnetic flux density, B .*

[An Overview of the Earth's Magnetic Field](#)

Magnetic flux is the amount of

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**magnetic field penetrating
perpendicularly through an area. A**

**coil of wire that experiences a
changing magnetic field and/or a
change in the area of the coil
causes ...**

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