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Flux coordinates in the context of magnetic confinement fusion (MCF) is a set of coordinate functions adapted to the shape of the flux surfaces of the confining magnetic trap. They consist of one flux label, often termed  $\psi$  and two angle-like variables  $\theta$ ,  $\phi$  whose constant contours on the flux  $(\psi(\mathbf{x}) = \text{constant})$  surfaces close either poloidally ( $\phi$ ) or toroidally ( $\theta$ ).

## Flux coordinates - FusionWiki

ty of the special types of coordinate systems in which the magnetic field lines appear as

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Tool Of Plasma Theory  
straight lines. These so-called flux coordinates sweep, so to speak, the complexity of the magnetic-field structure "under the rug", and permit the user to concentrate on the (other) physical issues.

~p~ger Senes in Computational Physics W D.  
W.N. G. Hitchon ...

The most significant difference between the magnetic field and the magnetic flux is that the magnetic field is the region around the magnet where the moving charge experiences a force, whereas the magnetic flux shows the quantity or strength of magnetic lines

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Test Of Plasma Theory produced by the magnet. The other differences between the magnetic field and magnetic flux are explained below in the comparison chart.

## Difference Between Magnetic Field & Magnetic Flux (with ...

The magnetic field strength (the magnetic flux density) can be defined using the force felt by a particle of charge travelling through it at a velocity  $v$ . If the magnetic field is perpendicular to the direction of particle's motion, then we have, If the term "magnetic field" is used to refer to a quantity rather than a region, it is most

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Likely referring to the magnetic field strength.

## Difference Between Magnetic Field and Magnetic Flux

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Key Takeaways Key Points. It is a change in the magnetic field flux that results in an

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electromotive force (or voltage). The magnetic flux (often denoted  $\Phi$  or  $\Phi_B$ ) through a surface is the component of the magnetic field passing through that surface.; In the most general form, magnetic flux is defined as 
$$\Phi_{\text{B}} = \iint_{\text{A}} \mathbf{B} \cdot d\mathbf{s} \dots$$

Magnetic Flux, Induction, and Faraday's Law | Boundless ...

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For convenience, the generalized angles are often chosen so that the magnetic field lines

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are straight when plotted on  $(\theta, \zeta)$  plane, i.e.:  $B = \chi' (\nabla \zeta \times \nabla \psi + q(\psi) \nabla \psi \times \nabla \theta)$ , where  $q(\psi)$  is the safety factor,  $\chi(\psi)$  is the poloidal magnetic flux with prime denoting the derivative with respect to  $\psi$ , and  $B \cdot \nabla \psi = 0$ . These coordinates are the so-called straight field line coordinates and they are particularly convenient for stability analysis.

## Canonical straight field line magnetic flux coordinates ...

Magnetic flux coordinates  $(\theta, \zeta)$   $f_{11}^2 = 1 - 2d^2 / R^2$  and replace  $F$  where  $dF = We$  then get:  $\chi(\psi)$ , where

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$\nabla \cdot \mathbf{B} = 0$   
 $\nabla \times \mathbf{E} = -\dot{\mathbf{B}}$   
 $\nabla \times \mathbf{B} = \mathbf{j} + \dot{\mathbf{A}}$   
 $\mathbf{E} = -\dot{\mathbf{A}} - \nabla \phi$   
 $\mathbf{j} = \nabla \times \mathbf{A}$   
 $\mathbf{B} = \nabla \psi \times \nabla \theta + \nabla \zeta$   
 $\mathbf{E} = -\dot{\mathbf{A}} - \nabla \phi$   
 $\mathbf{j} = \nabla \times \mathbf{A}$   
 $\mathbf{B} = \nabla \psi \times \nabla \theta + \nabla \zeta$   
 $\mathbf{E} = -\dot{\mathbf{A}} - \nabla \phi$   
 $\mathbf{j} = \nabla \times \mathbf{A}$   
 $\mathbf{B} = \nabla \psi \times \nabla \theta + \nabla \zeta$

Magnetic field line is defined by: The unrolled flux surface is deformed into a square such that the lines of constant  $\theta$  and  $\zeta$  form Cartesian grid. The

Working in toroidal geometry: \* magnetic flux coordinates ...

Abstract Toroidal flux coordinates are a set of poloidal and toroidal "angles"  $\theta$  and  $\zeta$  chosen such that the equation of a field line is that of a straight line in those

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coordinates. It is common to say that the magnetic-field lines appear as straight lines, or that the magnetic field is straight in  $(\theta_f, \zeta_f)$ .

## Toroidal Flux Coordinates | SpringerLink

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.

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Flux coordinates and magnetic field structure : a guide to ...

where  $\psi$  is the toroidal flux,  $\iota$  the rotational transform, and  $\theta$  the poloidal angle, such that the field lines are straight on the  $(\theta, \iota)$  plane, with  $\psi = \text{const}$ . The coordinates  $(\psi, \theta, \iota)$  are called symmetry flux coordinates [1], named also, in the tokamak, PEST coordinates [2]. While the construction of a straight field-line system from discretized field maps is not new [3], the method described here is rather simple and intuitive.

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Reconstruction of flux coordinates from discretized ...

Magnetic coordinates are a particular type of flux coordinates in which the magnetic field lines are straight lines. Magnetic coordinates adapt to the magnetic field, and therefore to the MHD equilibrium (also see Flux surface). Magnetic coordinates simplify the description of the magnetic field.

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