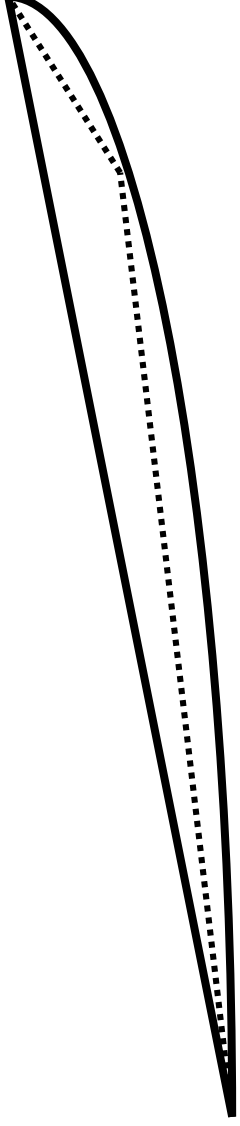

Magnetic Fields

Magnetic field

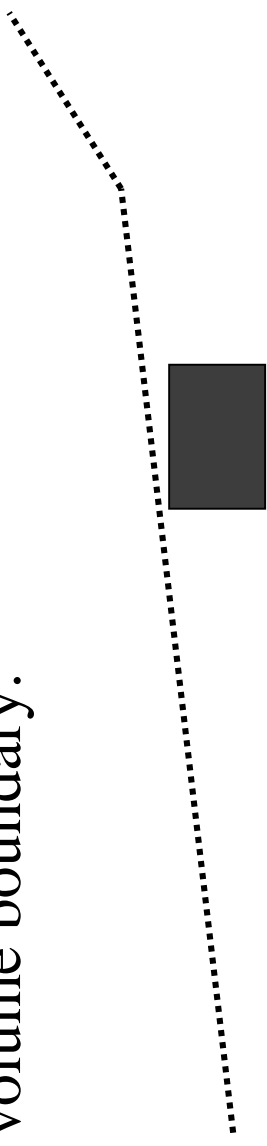
- In order to propagate a particle inside a field (eg magnetic, electric or both), the equation of motion of the particle in the field must be integrated.
 - In general this is best done using a Runge-Kutta method for the integration of ordinary differential equations. Several Runge-Kutta methods are available.
 - In specific cases other solvers can also be used:
 - In a uniform field as the analytical solution is known.
 - In a nearly uniform field where small perturbations can be applied.
-

Magnetic field

- Once a method is chosen that allows you to calculate the track's motion in a field, we break up this curved path into linear chord segments.

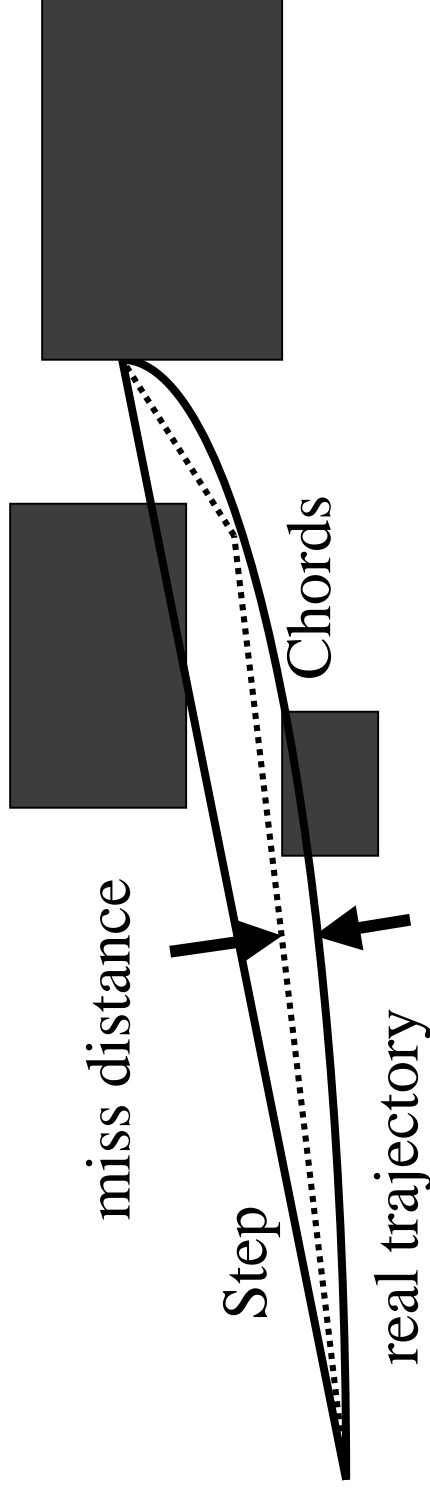


- We determine the chord segments so that they closely approximate the curved path.
- We use the chords to interrogate the Navigator, to see whether the track has crossed a volume boundary.



Magnetic field

- You can set the accuracy of the volume intersection,
 - by setting a parameter called the “miss distance”
 - it is a measure of the error in whether the approximate track intersects a volume.
 - Default “miss distance” is 3 mm.
- One step can consist of more than one chords.
 - In some cases, one step consists of several turns.



Magnetic field

- Magnetic field class
 - Uniform field :
G4UniformMagField class object
 - Non-uniform field :
Concrete class derived from G4MagneticField. Implements a
GetFieldValue() method
- Set it to G4FieldManager and create a Chord Finder.
G4FieldManager* fieldMgr
= G4TransportationManager::GetTransportationManager()
->GetFieldManager();
fieldMgr->SetDetectorField(magField);
fieldMgr->CreateChordFinder(magField);

G4FieldManager

- G4FieldManager stores a pointer to a G4Field object that describes a field in a detector (magnetic, electric, other)
 - It stores a pointer to a ChordFinder object that can propagate particles in this field. The geometrical “advancement” of a track is handled by this ChordFinder object
 - The ChordFinder must be created either by calling CreateChordFinder for a magnetic field or by the user creating a ChordFinder “manually”
 - A default G4FieldManager is created by the navigator and exists before the program be executed
-