The Concept of

AMANE'S
LAW OF SYNCHRONISATION
(ALS)

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I. Background

ASR was first discovered in October 2004, during a laboratory experiment. From the research, I found that some physical ideas on magnetism and electromagnism till today are yet to be fully uncovered. I have managed to come out some with more complete and precise ones over them.

ALS – complete explanation of Fleming's Left Hand Rule and Right Hand Rule, and proves that there is no difference between them. ALS also demonstrates a more accurate explanation on Magnetic Induction.

Though there might have some errors, inaccuracies in this theory, I believe the ideas brought out here have some little advancement on further basic understanding on magnetism as well as electromagnetism.

II. ALS terms translation (English, Chinese, Japanese)

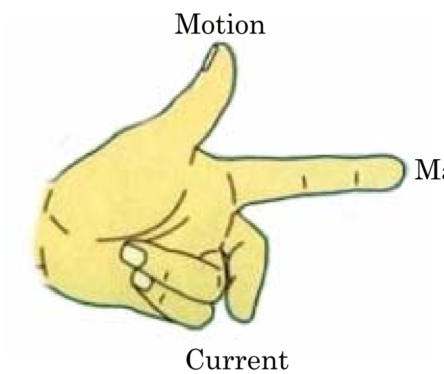
English	中文	日本語
Amane's Law of Synchronisation (ALS)	亚玛子同步法则	**アマネ連動法則**
Attracting Point (AP)	（吸点）	**（吸点）**
Repelling Point (RP)	（退点）	**（退点）**
Zero Induction	零磁导	**ゼロ磁導**
Zero Shifting	零位移	**ゼロ移動**
Line of Zero	零位线	**ゼロ線**
Synchronisation Point (SP)	同步点	**連動点**

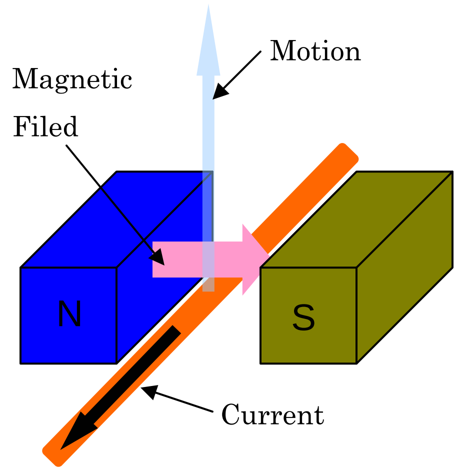
1. Amane's Law of Synchronisation (ALS)

1.1 Explanation of Fleming's Left Hand Rule (LHR) and Right Thumb Rule (RTR)

1.1.1 Fleming's Left Hand Rule (LHR)

Sir John Ambrose Fleming (1849 – 1945)

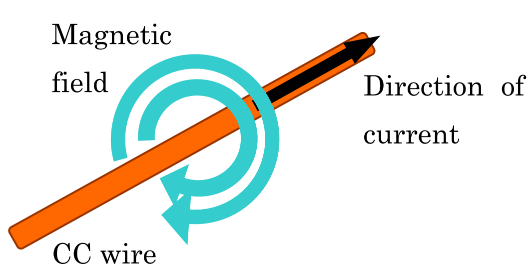


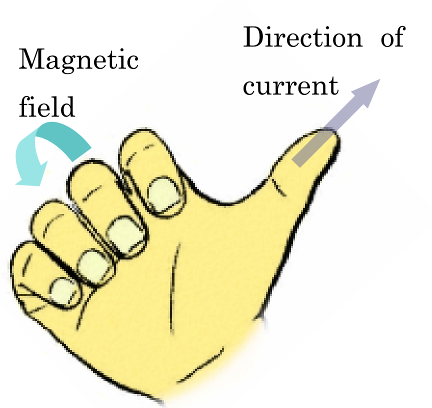


For given a strand of current-carrying (CC) wire and a magnet, the behavior of the strand of CC wire can be described as Fleming's Left Hand Rule (LHR):
Thumb (Motion):
The motion of CC wire is going upwards in responding to the magnetic field of the magnet.
Index finger (Magnetic Field):
Magnetic North pointing towards South (left to right)
Middle finger (current):
Current flowing direction towards reader (+ → -)

<u>Note:</u> Fleming's LHR describes only the situation such that magnet is static and the wire is dynamic.

1.1.2 Right Thumb Rule (RTR)



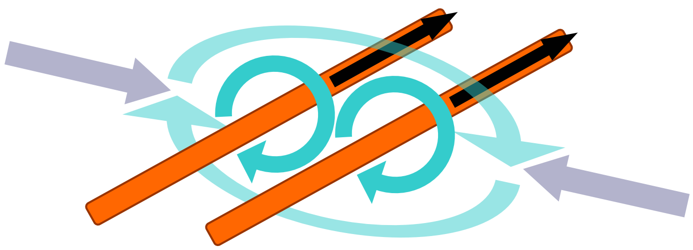


The magnetic field lines around a CC wire forms concentric circles around the wire. The direction of the magnetic field is perpendicular to the CC wire and is in the direction as shown. This is described as Right-Thumb Rule.

ALS is the further explanation of LHR as well as RTR. The basic concept of ALS will be explained in the following topics.

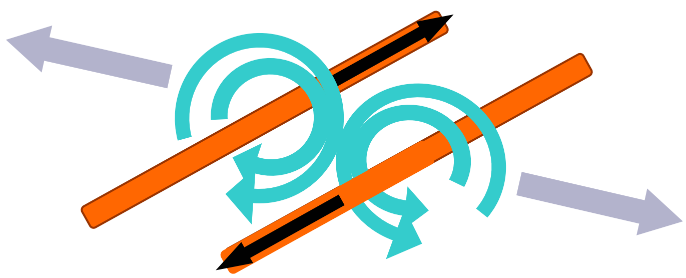
1.2 Parallel CC wires.

1.2.1 Parallel CC wires of same current direction.



The same concentric direction magnetic fields of two CC wires tend to synchronise each other by forming a big concentric magnetic field. This creates an attractive force between the two wires and hence pulling the two wires towards each other. This is also a very simple concept of ALS.

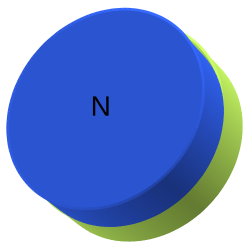
1.2.2 Parallel CC wires of opposite current direction.



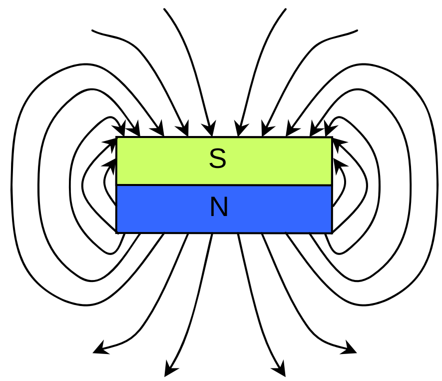
Two CC wires of different current directions produce concentric magnetic fields that opposite each other (this is due to magnetic pressure between the wires increases). This creates a repelling force between the two wire wires and hence pushing themselves away each other. This is Anti-ALS.

1.3 Make CC wire static

In the Fleming's LHR, the concept of static magnet and dynamic CC wire is being applied. In ALS, the opposite way, dynamic magnet and static CC wire will be used for explanation. Two elements, a simple static CC wire, and a small piece of coin shape magnet are used to make the explanation.

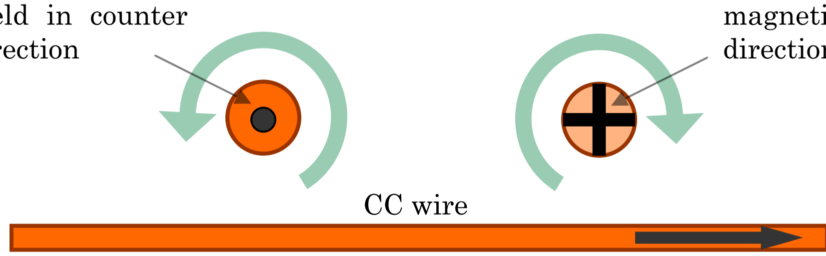


A coin shape two-pole magnet of pole end on the round flat surfaces

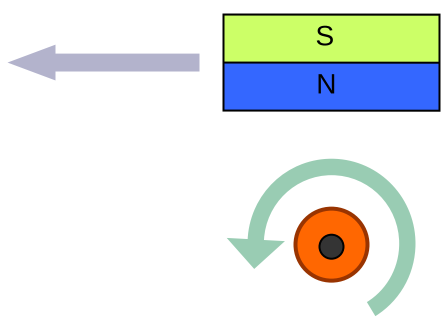


CC wire of concentric magnetic field in counter clockwise direction

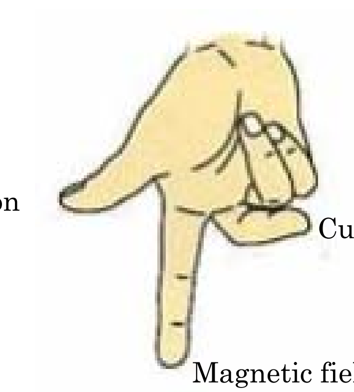
CC wire of concentric magnetic field in clockwise direction



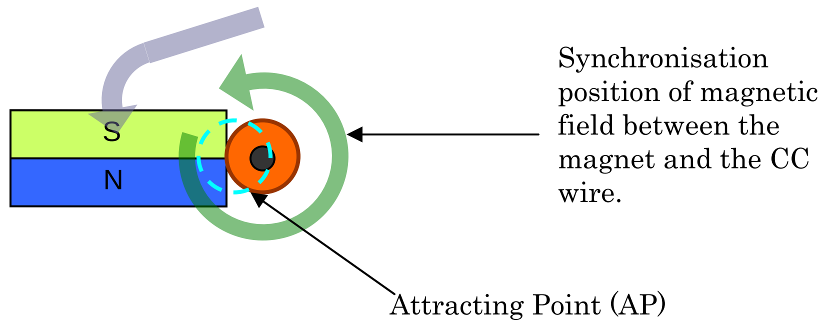
CC wire



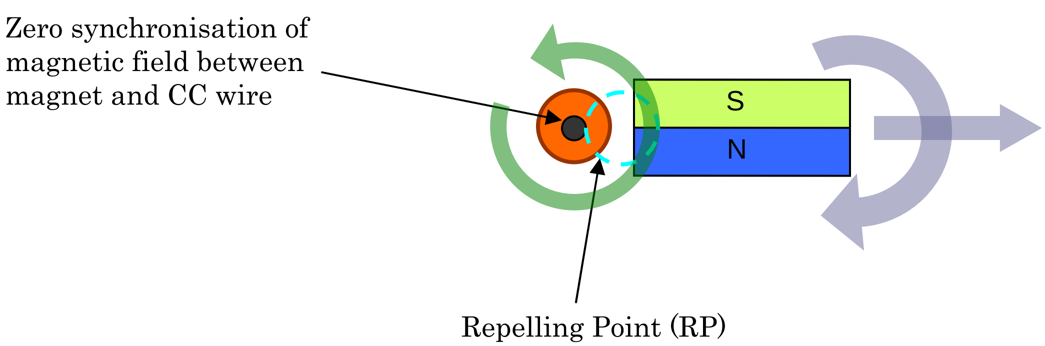
Motion



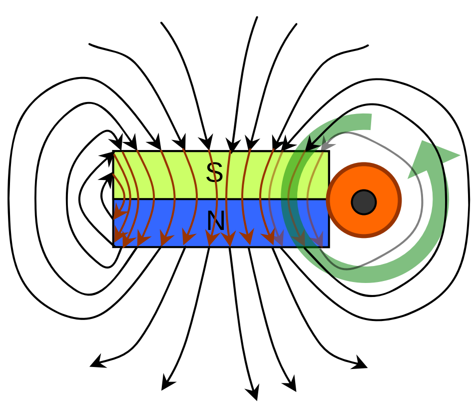
Refer to the above figure, according to Fleming's LHR, the magnet move towards the direction as shown by the arrow. Making the CC wire static, this has become right-hand-rule (RHR). According physics law, there must be a point of motion starting and a point of motion ending. The movement of the magnet is determined by the interaction of the magnetic field between the magnet and the CC wire. The magnet does not keep on going straight to the direction pointed by the arrow, the center portion of the magnet (that is between north and south) stops at the CC wire body. This is the Attracting Point (AP). The magnet stops here due to the magnet and the wire have the best synchronisation position of the magnetic field between them.



On the other hand, the magnet of same position, south on top and north below, is placed on the other side of the wire as shown below, the magnetic field between the magnet and the CC wire is opposite (opposite on their magnetic field). This is the Repelling Point (RP). The magnet itself will look for magnetic field synchronisation position with the CC wire; it will flip over for magnetic field synchronisation or move away from the CC wire through either way shown by the two arrows. Or, the magnet will just move back to the left side of the wire using RHR to synchronise with the magnetic field of the CC wire.

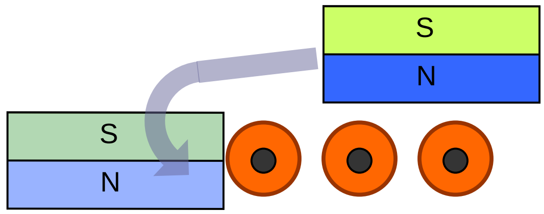


AP and RP are determined on the magnet itself with respect to the current direction in the wire. This is the simple explanation of **Amane's Law of Synchronisation (ALS)**.
From Amane's Law of Synchronisation, it shows that the internal magnetic field direction of a magnet is pointing from South to North. There is another way to prove this symptom and it will be explained in 1.8.1.2.

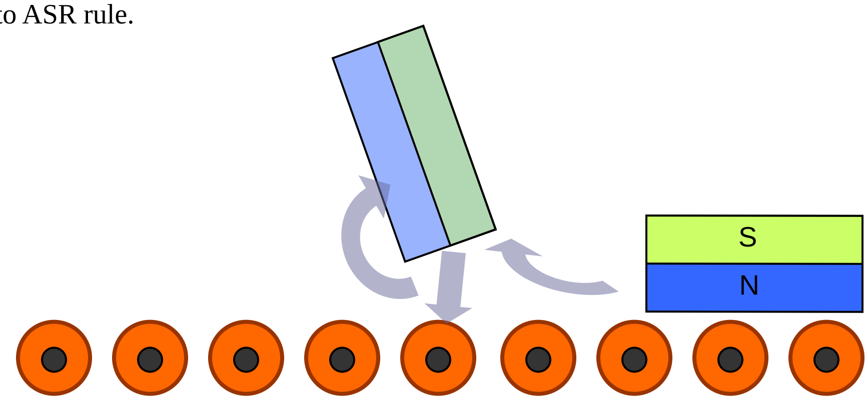


1.4 Multiple CC wires

If there are a few strands of CC wires of same current direction lying together, according to RHR and ALS, the magnet will move following the arrows and stop at the left most strand of CC wire if the gap distance between strands of CC wires is small.



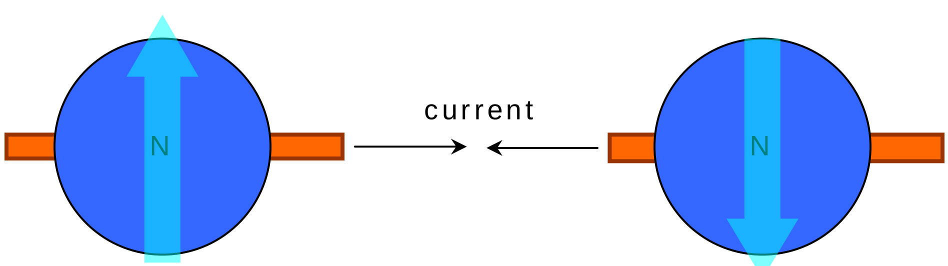
If there are many strands of CC wires of same current direction laying together, the magnet will, instead of moving towards the left most strand of CC wire, the magnet might flip itself in clockwise direction and attracts towards any strand of CC wire. In this case RHR is no more applicable. Whereas the magnet flips is due to ASR rule.



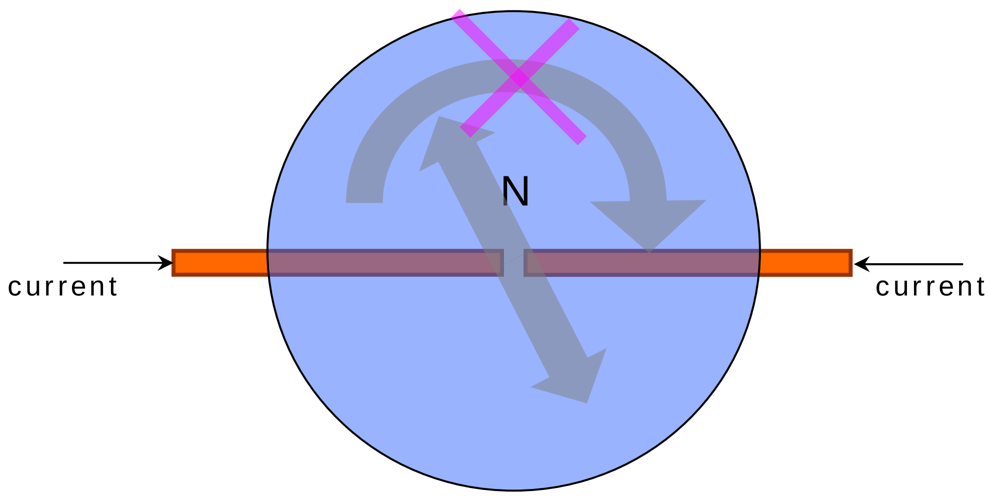
There is another effect to the movement of the magnet if the strands of CC wires are of in one wire like solenoid. This effect will be explained in section 2.1.2 of **Half Field** and 2.2.1 of **Half Magnet** under **Amane's Law of Half Synchronisation (AHS)** in the second portion of this thesis.

1.5 CC wires of current having opposite directions

According to RHR with respect to Fleming's LHR, the magnets will move to the arrows shown:



If a magnet is placed in the center of two CC wires of current direction opposite as shown below, according to ALS rule, the magnet will not rotate. This is due to there is no synchronisation location between one magnet and two current opposite CC wires for the magnet to rotate. In reality, it depends on the strength of the current in the CC wires and the exact position of the magnet, the magnet will either move up-leftwards or down-rightwards (it can only synchronise with one CC wire).



1.6 Simple Magnetic Induction using ALS concept

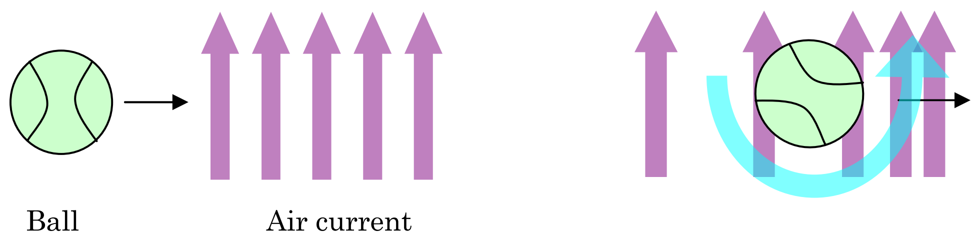
1.6.1 Heinrich Lenz's Law(1833) of Magnetic Induction

- **Russian physicist Heinrich Lenz's law of magnetic induction (1833) states:**

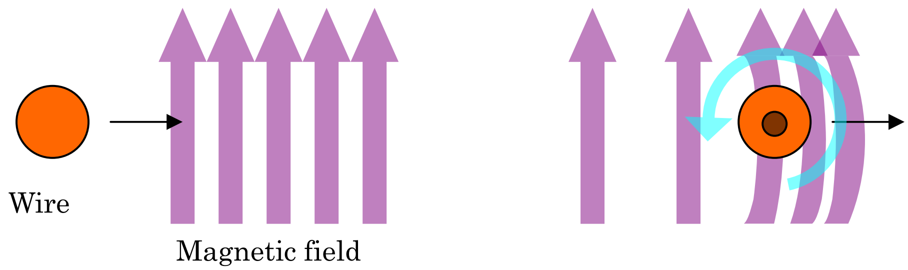
  The induced current produced in the conductor always flows in such a direction that the magnetic field it produces will oppose the change that is producing it.
  (From Wikipedia, Lenz' Law, definition)

1.6.2 Ball rolling in air current effect magnetic induction and Lines of Zero Induction

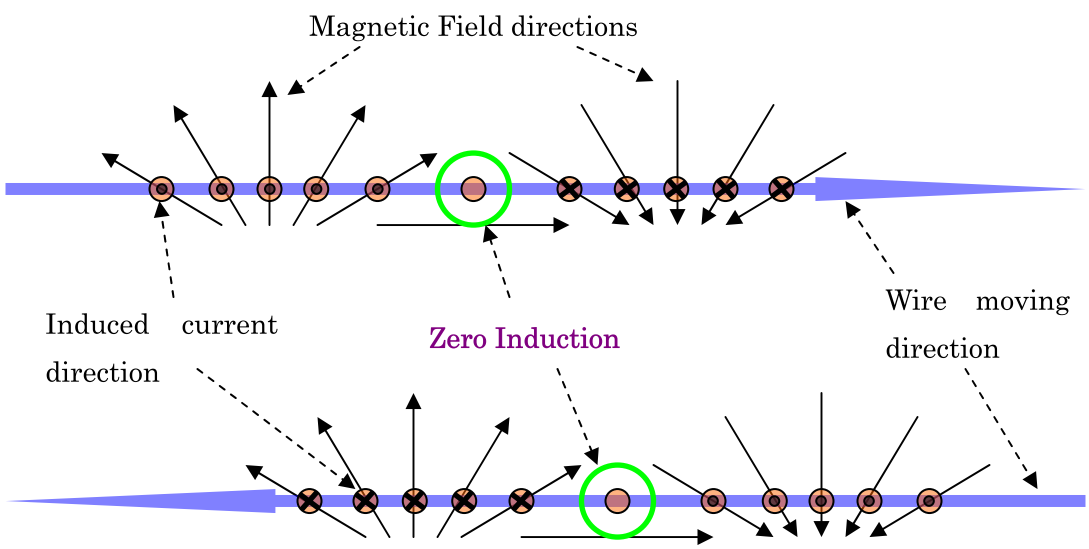
From the pictures below it can be easily understood that when a rotationless ball is being thrown into an area of air current, the ball rotates in the CCW direction. The front point of the ball contacts with air current first that will force the ball to rotate. The air current portion in front of the ball is being pressed by the ball (this further increases the rotation/force intensity force onto the ball), the rear point of the ball becomes lower in air current pressure; this provides a lesser rotation force intensity for the ball on this surface, so the ball rotates in CCW direction.
This simple concept can be also used to explain magnetic induction concept.



Below shows a cross-section of a wire and a magnetic field. When the wire moves into the magnetic field, it pushes the field and this creates a larger pressure in the front surface of the wire and leaves a lesser pressure behind. With this, just like the ball flying through a pool of air current, the magnetic field produced by the induced emf by the wire tends to synchronise with the magnetic field. The induced magnetic field rotates in CCW direction.

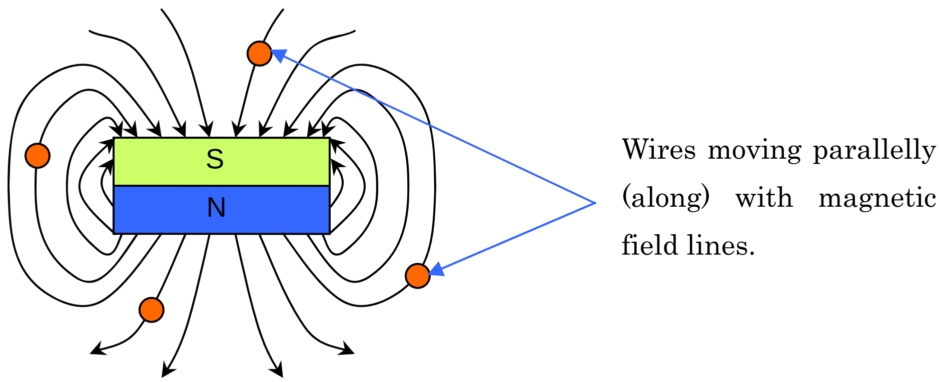


In general, the two pictures below show that how the magnetic induction takes place within the wire of moving in a straight line with respect to varies direction of magnetic field. There is no magnetic induction in the wire when the direction movement of the wire is in parallel with the magnetic field. This is termed as: **Zero Induction**.



This magnetic induction maximizes when the moving direction of the wire is perendicular with respect to the magnetic field.

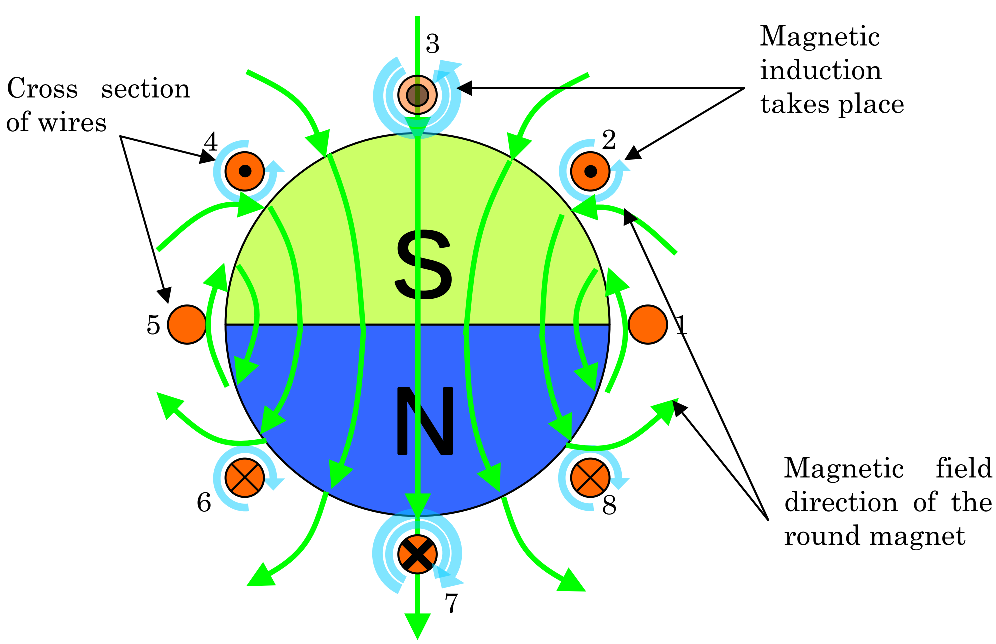
As long as the relative movement direction of the wire to the magnetic field is in parallel, there is no magnetic induction occur in the wire. Hence the (imaginary) lines of magnetic field are also the **lines of Zero Induction**. The picture shown below is in two-dimension, in real world of three-dimension, it is almost impossible to prove this concept practically.



Lines of Zero Induction

1.6.3 Round magnet magnetic induction

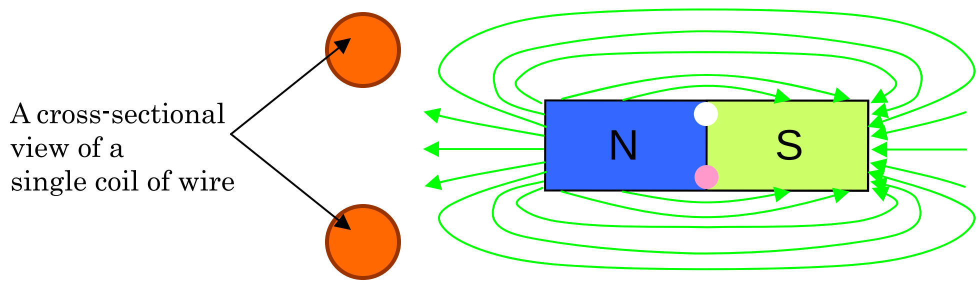
This is the further explanation on 1.6.2. Below is a coin shape-like flat round magnet with South pole on the upper half and North pole on the lower half. Surrounding is a cross-sectional view of a closed circuit wire moving around the magnet from point 1 to 8 then 1 again.



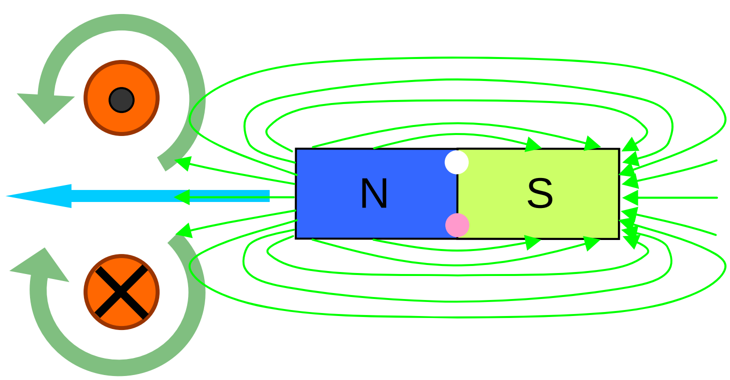
When the wire starts to move from point 1 to point 2, it cuts through the magnetic field just like the explanation in section 1.6.2, an emf is induced in the wire such that the magnetic field produced is rotating in CCW direction. This also means that the induced magnetic field in the wire tends to synchronise the magnetic field of the round magnet after point 1. This magnetic induction effect remains the same until right before point 5. Since the magnetic field of the round magnet is of non-straight lives, the peak magnetic induction effect is at point 3. At this point 3, the magnetic field of the round magnet and the movement of the wire are at right angle. The magnetic induction within south pole is taking up from point 1, strengthening though point 2 and, at its peak at point 3. After point 3, the magnetic field of the round magnet and the movement of the wire are out of right angle again, so the magnetic induction starts to weaken. Till point 5, the magnetic induction reduces to zero as at this point the movement of the wire is in parallel with magnetic field direction of the round magnet (point of Zero Induction) . Within the region of south pole, the induced magnetic field within the wire is intending to synchronise with the magnetic field of the round magnet at point 1. After point 5 till point 8 then point 1, the magnetic induction concept is the same as that from point 1 to point 5.

1.6.4 Single coil solenoid magnetic induction

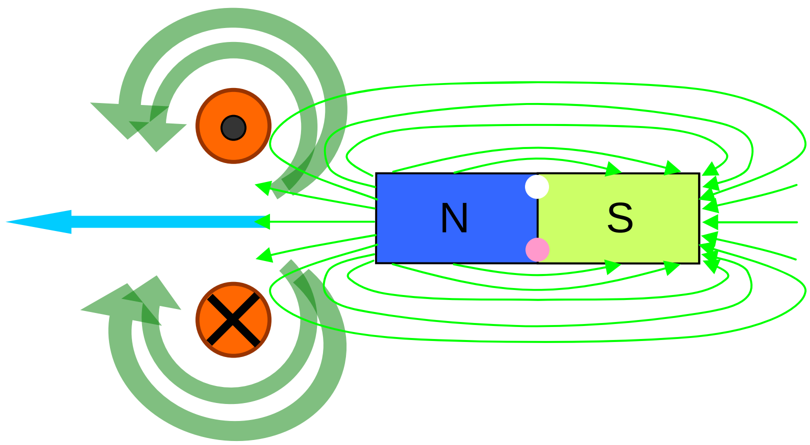
Here is an explanation of magnetic induction using a single solenoid coil and a bar magnet. This explanation is using the concept being explaind in bothsection 1.6.2 and 1.6.3. Using a single coil solenoid is for easy understanding.



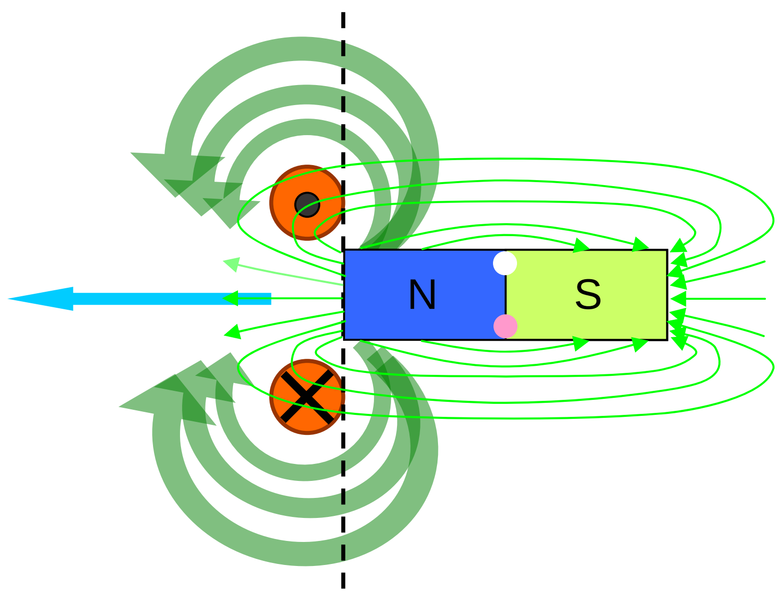
a) When the magnet is moving towards the coil wire, it may seem that the single coil of solenoid tries to oppose the incoming magnet north field by producing a north in itself; it is producing a magnetic field that tends to synchronise with the incoming magnetic field. The magnetic field produced in the upper half coil synchronises the incoming magnetic field with respect to the pink dot point (similar to opposite direction of point 6 in 1.6.3). This is too for the lower half coil with respect to the wite dot point (similar to same direction of point 8 in 1.6.3).



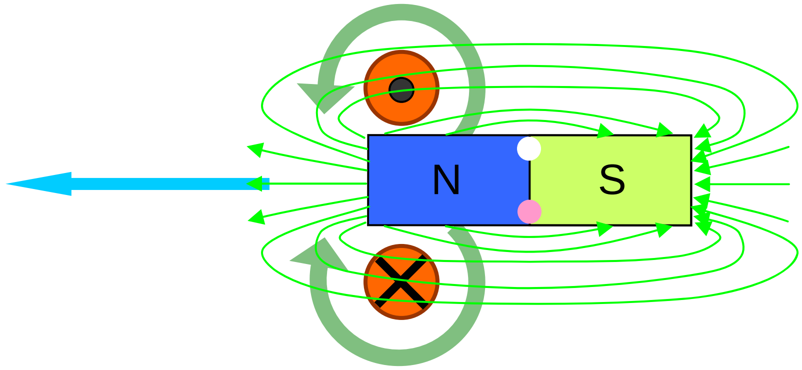
b) This induced magnetic north field is getting stronger and stronger at the when the north end of the magnet is getting near to it. At this point, the coil encounters many 'turning' magnetic field from the north pole, this means that the magnetic field is cutting through the coil at right angle. So the strength of induction increases fast.



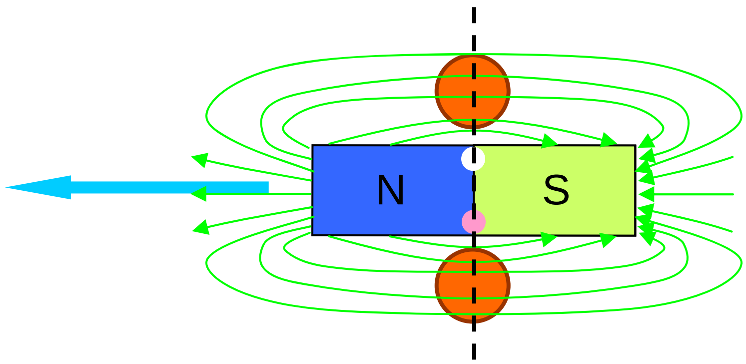
c) This induced magnetic north field maximizes when the end point (dotted line) of the north pole of the bar magnet reaches somewhere right infront of the coil wire (but NOT exactly in middle of the coil) (equivalent to opposite and same direction at point 7 in 1.6.3 respectively).



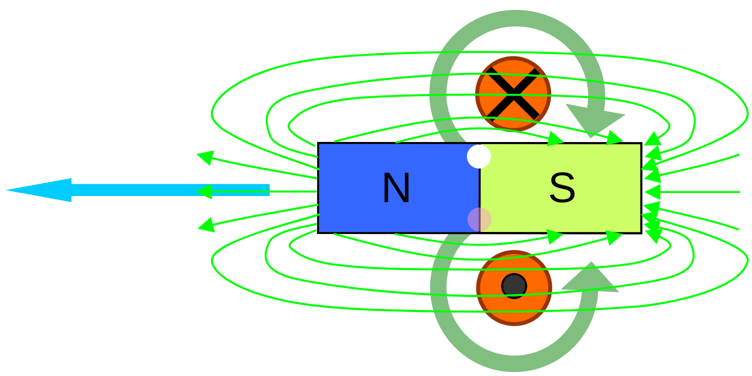
d) As the north pole of the bar magnet goes in further right after its end point, the direction of the magnetic field is getting parallel with the moving dirction of the coil. The strength of the induction reduces gradually (equivalent to opposite dirction of point 6 and same direction of point 8 in 1.6.3 respectively).



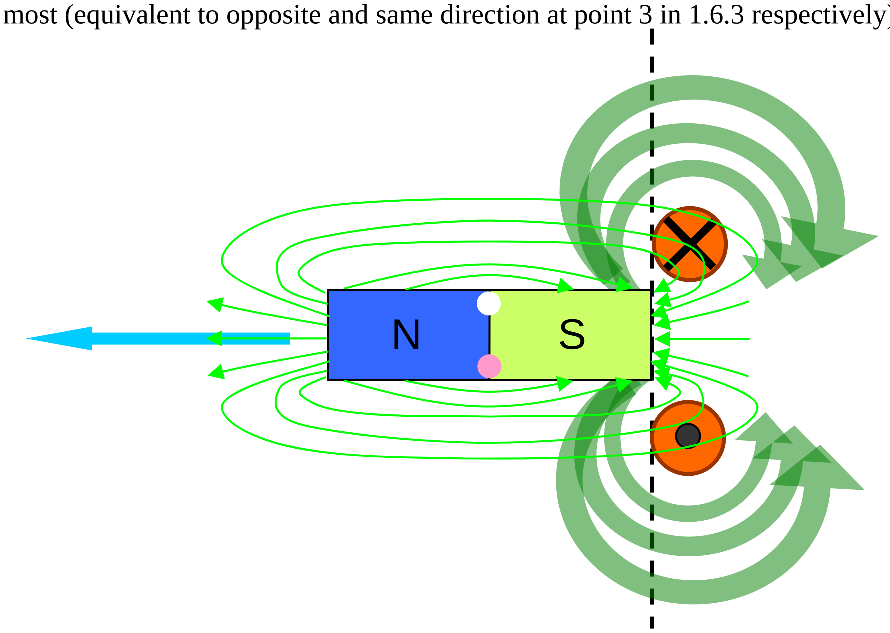
e) When the middle of the bar magnet reaches the middle of the coil, this is the point where the moving magnetic field is in parallel to the relative movement to the coil: point of **Zero Induction*** (dotted line). So at this point, there is no magnetic induction on the wire (equivalent to point 1 & 5 in 1.6.3).
*This point of Zero Induction shifts (i.e. Zero Shifting) when two or more magnets are put together. This effect will be explained in detail in section 1.8.2.



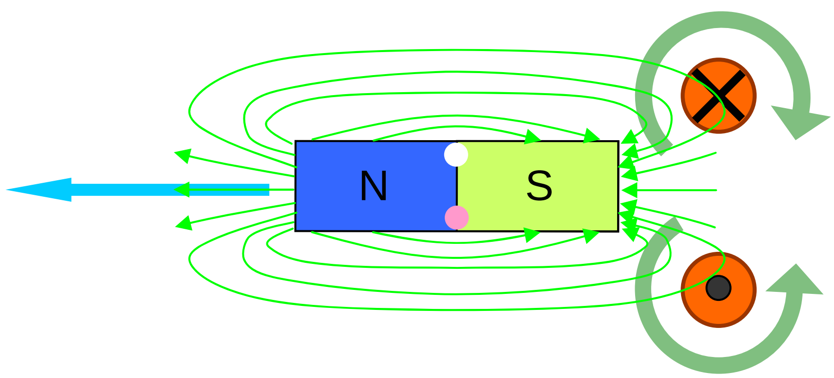
f) As the magnet moves on, the solenoid coil is moving towards south pole end relatively, so the magnetic field with relative movement of the coil is not in parallel. Thus this induces a magnetic field around the coil that synchronises the white dot point for upper half coil (equivalent to opposite direction of point 4 in 1.6.3), this is the same happening to the lower half coil tends to synchronise with the pink dot point (equivalent to same direction of point 2 in 1.6.3). This induction strengthens up gradually as the coil is yet to experience a right angle magnetic field.



g) The induction strength maximizes at south pole end (dotted line) of bar magnet passes right after the coil; this is when relative movement of the coil cuts the through the magnetic field at right angle the most (equivalent to opposite and same direction at point 3 in 1.6.3 respectively). .



h) The strength of induction weakens fast as the bar magnet leaves the coil (similar to opposite direction of point 4 and same direction of point 2 in 1.6.3 respectively).



The same explanation applies when a magnet moves through a coil of wire with south pole first.
In general,

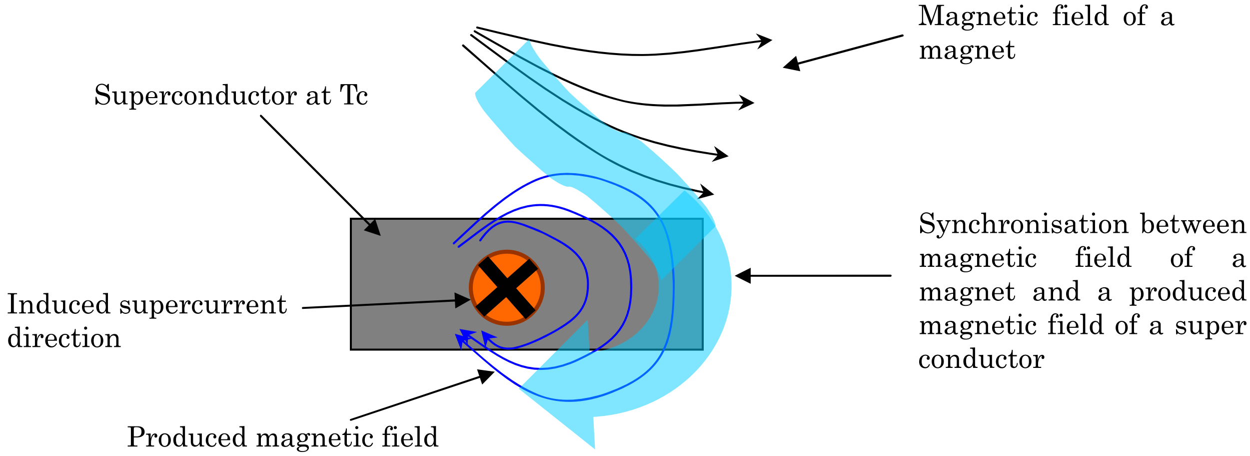
- **When a magnet moves into or away a closed circuit coil/solenoid of wire, the induced current within the coil such that it produces a magnetic field that synchronises to the moving magnetic field (or, the moving magnetic field 'forces' the coil/solenoid of wire to induce a current such that its magnetic field synchronises it).**
- Zero Induction occurs when the relative movement of the coil reaches the centre of the magnet; the relative movement direction of the coil and the magnetic field of the magnet are in parallel position.

1.6.5 ALS in The Meissner Effect of Superconductor

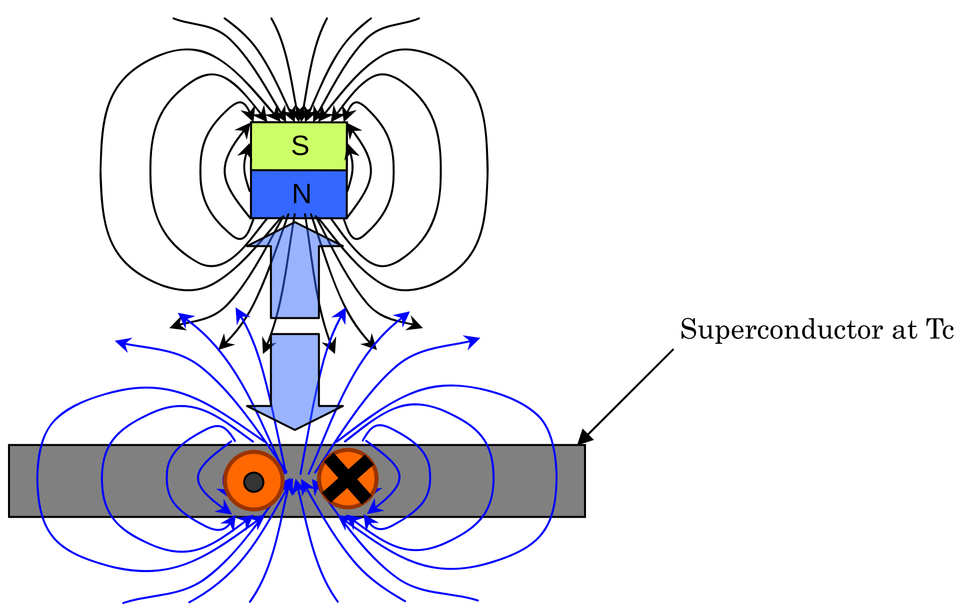
1.6.5.1 Basic Concept

At critical temperature (Tc) of a conductor its resistance reduces to zero; this is a superconductor.

When a magnet is brought near to the superconductor, its magnetic field causes the superconductor to induce a supercurrent such that the magnetic field produced synchronises the magnetic field of the magnet (refer to figure below). This is a simple concept of ALS that is the same as article 1.6.

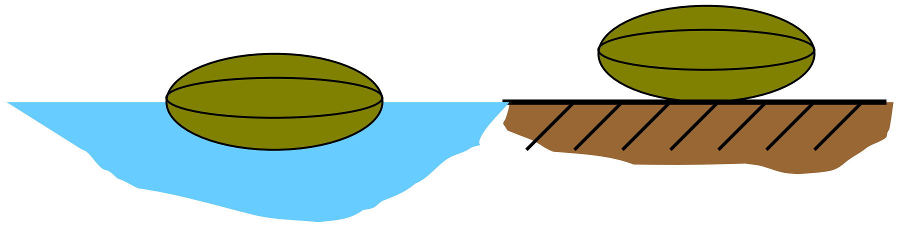


At zero resistance, the induced current will produce a magnetic field that is having the exact magnetic field strength of the magnet. So the magnet is being “pushed” back and remained in the air at a certain distance. If the resistance is above zero (ie. the temperature of the superconductor increases above its Tc), the distance between the magnet and the superconductor will reduce until at a temperature that they torch each other.

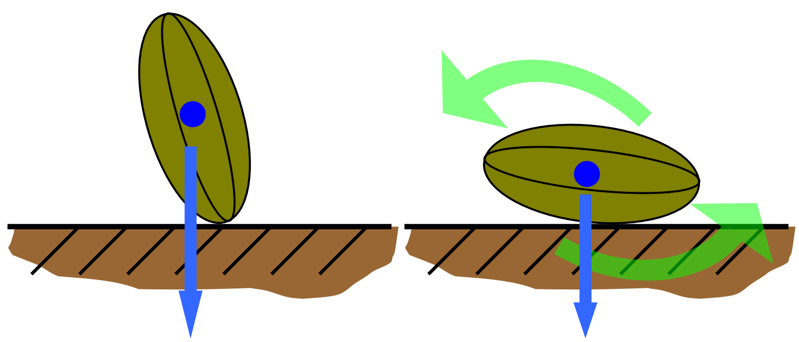


1.6.5.2 Maglev positioning

1.6.5.2.1 The Ruby Ball

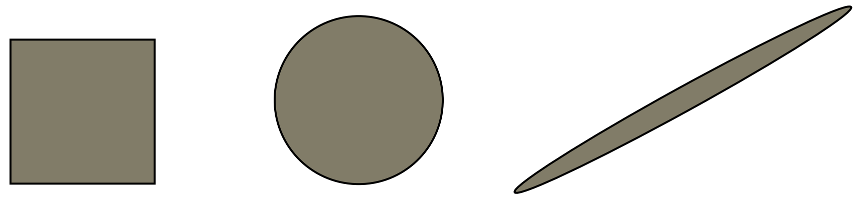


From the above two pictures, it can be easily understood that the rugby ball is in horizontal position when it is not able to go through a medium such as hard ground or, a pool of liquid (of density heavier than itself). This is explained with the CG (Centre of Gravity) of the rugby ball shown below. The CG will cause the rugby ball to move further down by rotating the ruby ball to horizontal position until it meets a shortest distance between the CG of the rugby ball and the medium.

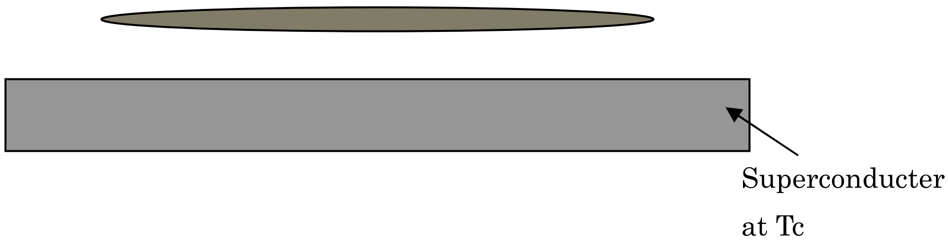


The behavior of the magnet during maglev is similar to that of a rugby ball that unable to go through a medium.

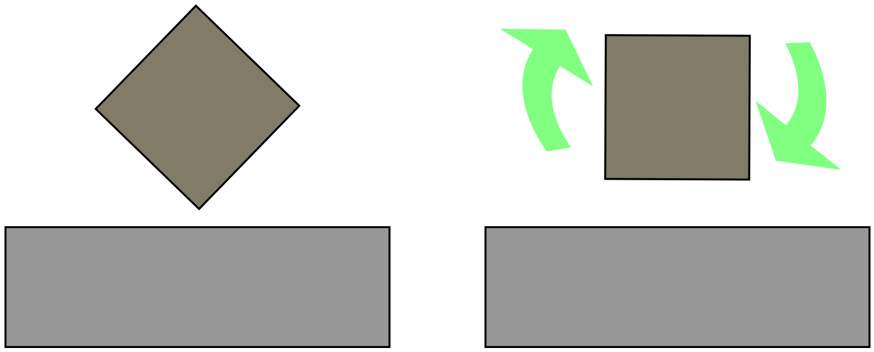
1.6.5.2.2 The magnet



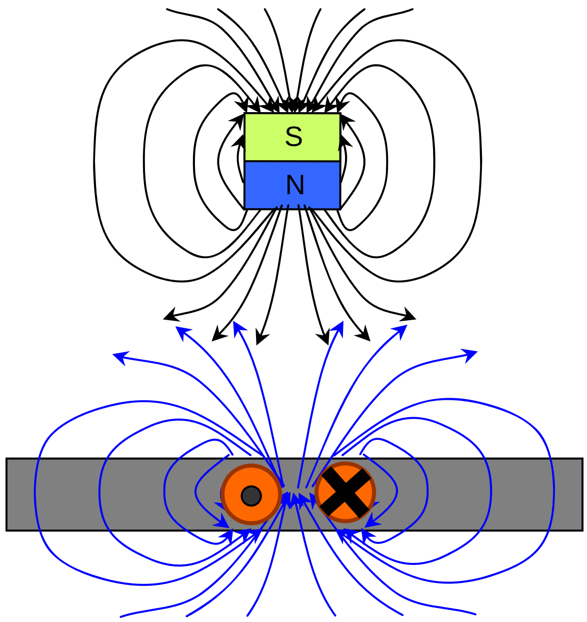
Let's consider there are three simple shapes of a magnet: cubical, spherical and rod shape. For maglev, first of all, inspite of magnetic field of the magnets, magnet of rxtreme shape like rod shape will be considered first. As described in the concept of [The Rugby Ball] concept, the rod shape magnet will behave as shown:

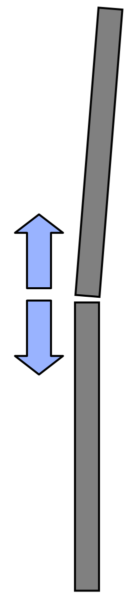


As for spherical shape magnet, it is understood that there will be not restriction on its position. But there is still a specific position for it if the magnetic field of the spherical magnet is being considered together. This will be discussed later.

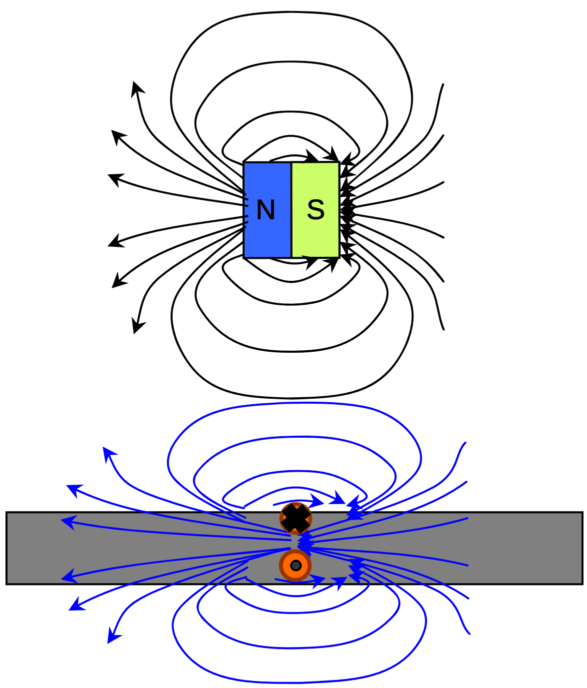


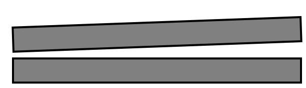
The magnet of cubical shape behaves such that just like the explanation being done in [The rugby ball] concept, the cube magnet cannot balance itself with its corner. So it will station itself at a flat surface against the superconductor.
Next, the magnetic field will be included in the positioning.





Take a look at the picture above. There is a single pole from the magnet pushing against the induced single pole from the superconductor. This behavior is just like rod pushing against another rod (picture on the right); there is a problem in balancing. The magnet rotates.



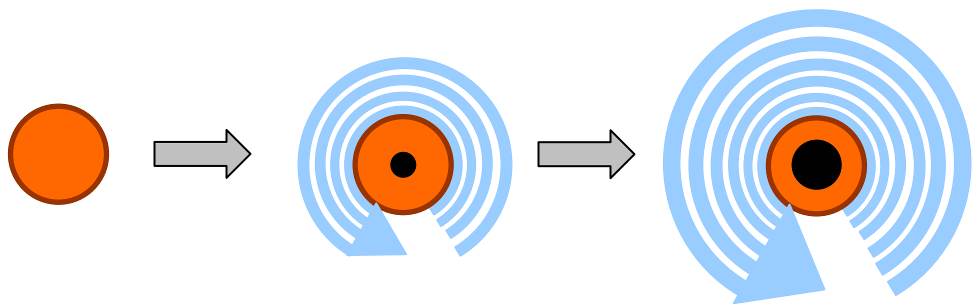


It would be better for the rods to push against each other if they maximize their surface of balacing. So for even shape magnets like cube, sphere, the theory Maglev Positioning applies. In real world, perfect condition might not happen due to factors like purity of materials within the magnet as well as the superconductor and, the accuracy of the magnetic poles being charged into the magnet.

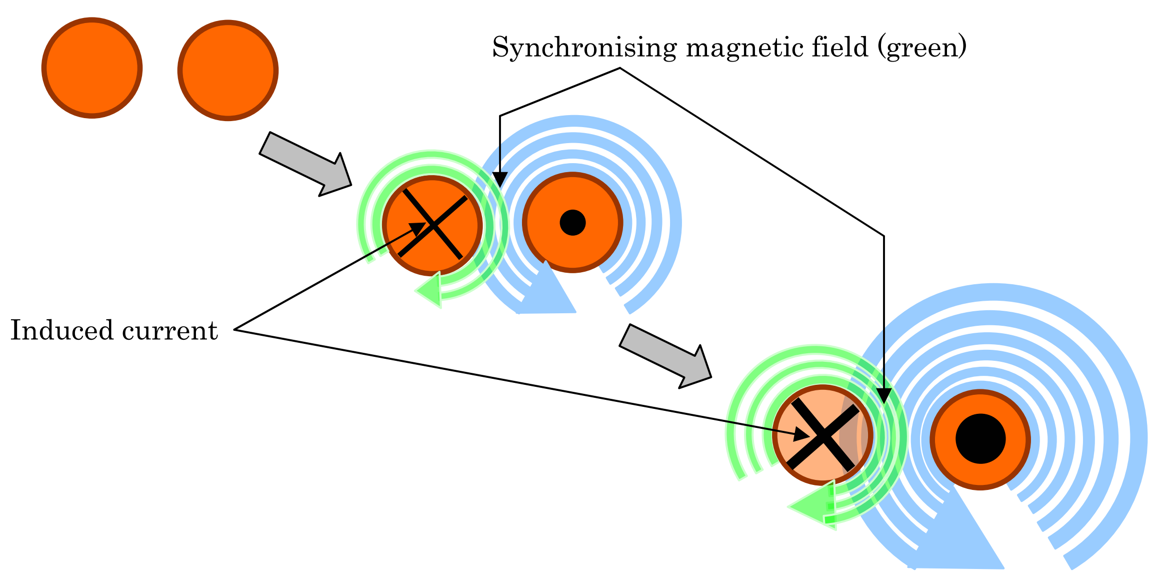
1.7 ALS in Mutual Induction

1.7.1 Wire to Wire

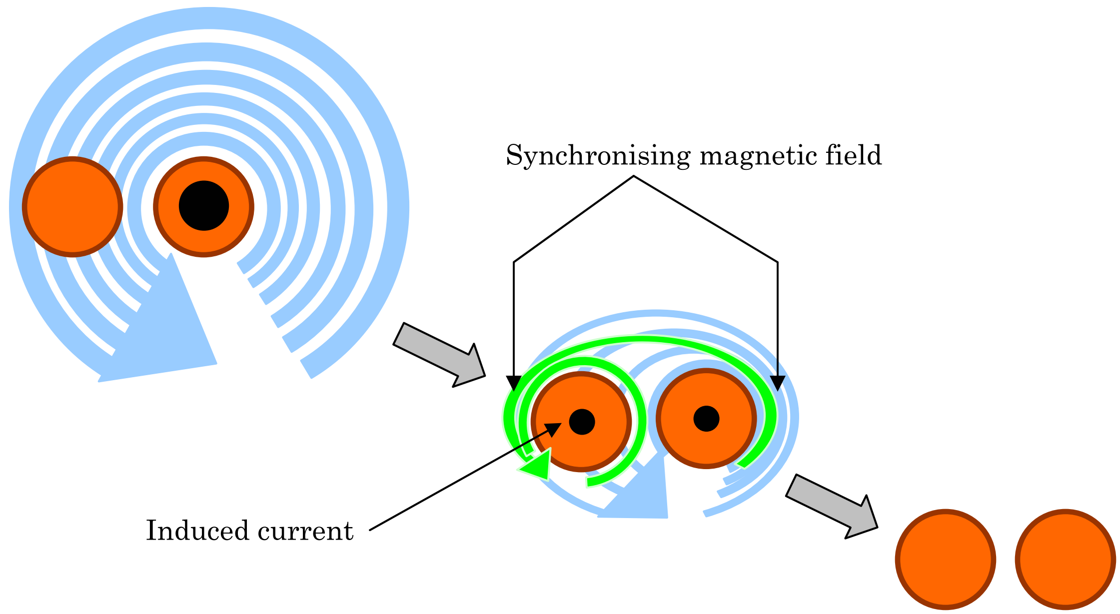
It is known that when there is a current flows in a wire a magnetic field will be produced from the wire centre. With a certain permeability of the surrounding air the flux density is built up with respect to the current level. When this current level increases, the produced magnetic field spreads out with the same permeability of the air. According to right thumd rule, the magnetic field circulates in counter clockwise direction with current follow out of the paper.



Let's place a wire of different circuitry next (left) to this wire. When the current level of the CC wire increases from zero, the magnetic field builds up from the centre of the wire. As explained before, the magnetic field spreads out with respect of the increasing current in a constant permeability environment. This spreading magnetic field is actually behaving like a moving magnet. If the increasing speed of current is in an instant like turning on a power switch, the produced magnetic field will spread at the similar speed. At this instant of current increment, the relative physical behavior on the wire of the left is just like cutting through the spreading magnetic field (from left to right, same concept as explained in 1.6.2, 1.6.3 and 1.6.4). The right surface of the wire will encounter the spreading magnetic field first. The encounterd surface produces a magnetic field that tends to synchronise with the preading magnetic field with an induced current flowing towards into the paper. When the current stops increasing, the magnetic field spreading stops too. So the effect of cutting through the magnetic field on the left wire stops also eventually.



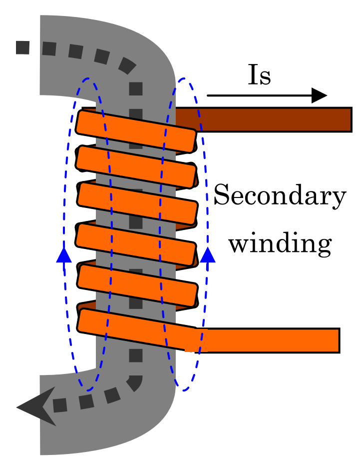
Since there is no cutting effect taking place, there is no current induced in the left wire even though there is a consistant high current flowing in the right wire. When the current in the CC wire (right) drops, its produced magnetic field shrinks too. The shrinking magnetic field is having an effect of similar to a moving away magnet. The left side of the left wire encounters the cutting effect first. The encounterd surface is forced to produce a magnetic field that synchronises with the shrinking magnetic field with an induced current flowing towards out of the paper (same concept as explained in 1.6.2, 1.6.3 and 1.6.4). When the current reaches zero, the magnetic field shrinks to zero too. So the effect of cutting through the magnetic field on the left wire stops also, and hence the induced current falls back to zero eventually.



1.7.2 Transformer

ALS also applies to the mutual induction in transformer. Over here it is slightly different from 1.7.1 that the magnetic field approaching secondary winding does not come directly from primary winding; it comes from the core that circulating the magnetic field produced by the primary winding.

At the instant of the magnetic field direction (clockwise) produced by the primary winding, the secondary winding produces a magnetic field tends to synchronise the magnetic field produced by primary coil with an induced current, Is, flowing at the direction shown.

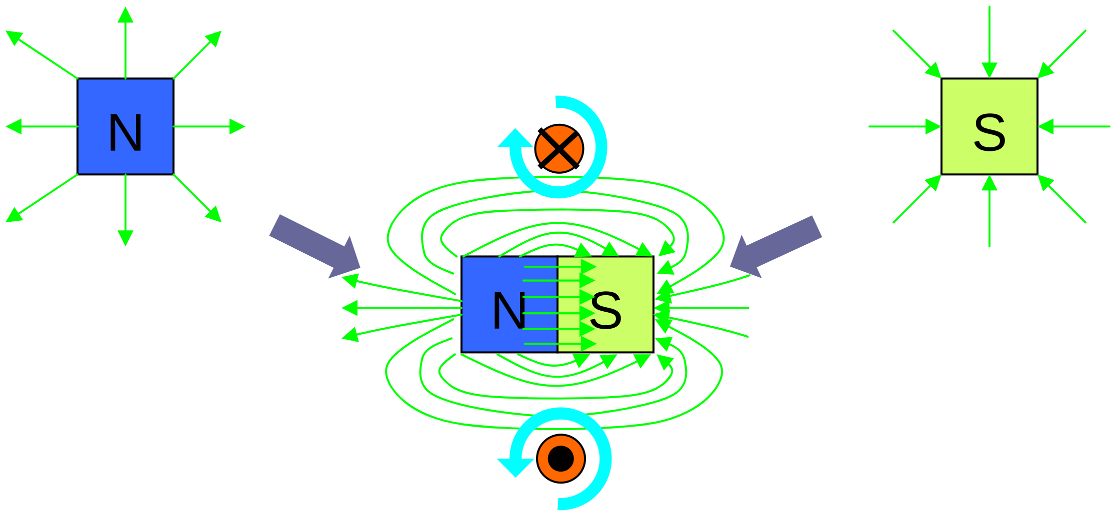


1.8 Other ALS Concepts

1.8.1 Magnet combinations

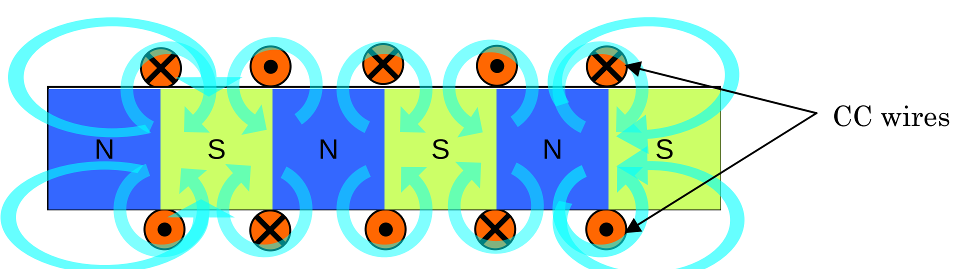
1.8.1.1 Magnetic monopole

Imagine that when two different poles of magnets of monopole are put together, the lines of magnetic field behaves such that all lines from the North are pointing towards the South. This includes the region of contacting surface between the two monopoles. If a CC wire is put near to these monopole magnets, the CC wire cannot find a synchronisation point (AP) with the magnets, so it will be pushed away by the magnets. (Imaginary theory).

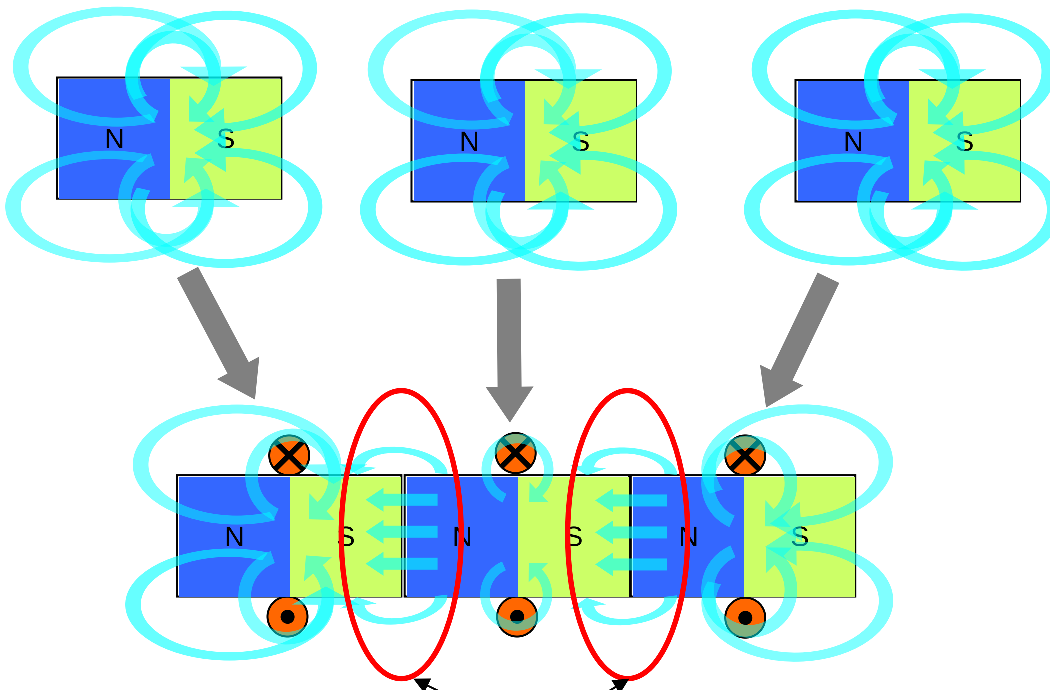


1.8.1.2 Two-pole magnets combination versus a multi-pole magnet

There are many AP points or RP points on a magnet of multi-pole of picture shown below. This magnet behaves just like normal magnet; all the magnetic fields are circulating in complete path. So these provide synchronisation points for the CC wires.



Put a few pieces of two-pole magnets together. Let north pole joins to south pole and again north pole joins to south in a straight line (picture below) just like the multi-pole charged magnet shown above. The joining poles of the magnets (red circle) are acting like monopole magnets mentioned in section 1.7.1.1. At these joining points, there is no complete loop of magnetic field. So if a CC wire is placed towards these points the CC wire is 'pushed' away and attacts to the nearby available synchronisation point.

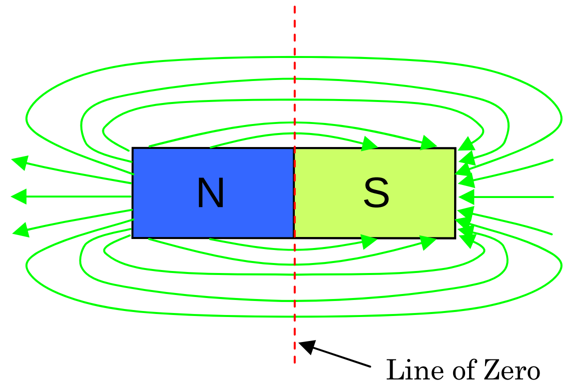


No synchronisation point for CC wire

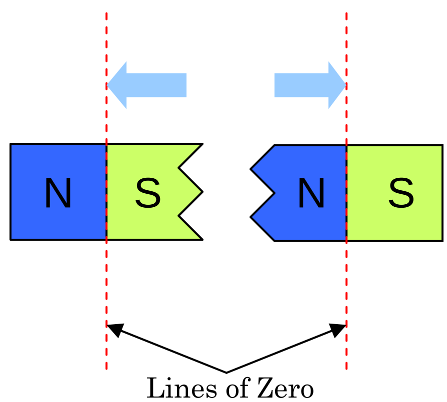
From the above explanation, it can be concluded that a magnet of multi-poles and a number of two-pole magnets combined together are NOT the same at all. This experiment further proves Amane's Law of Synchronisation (ALS) and also, within a magnet the magnetic field is always pointing from South to North.
From the above experiment, the magnets encounter a shifting of their AP and RP (or Point of Zero Induction mentioned in section 1.6.2). This symptom will be explained in the following section: Zero Shifting.

1.8.2 Zero Shifting

When there is a bar magnet goes through a solenoid or the solemoid goes through the magnet, a magnetic induction is taken place within the solenoid. There is a time when the middle of the magnet passes through the coil that there is no magnetic induction takes place; this is when there is a change of magnetic field direction. At this point when the magnetic field changes its direction, this means that when the direction of the magnetic field is in prarallel with the magnet body. Next, a line is drawn linking these turning points and though the magnet body at right angle. This line is termed as Line of Zero (refer to the red dotted line in the picture below). This, Line of Zero, does not mean that zero induction in this region; this depends on the relative movement of the magnet and the wire. If a wire is moving along the red dotted line, a magnetic induction at its peak condition will take place due to the relative movement of the wire and the magnet field are at a right angle.



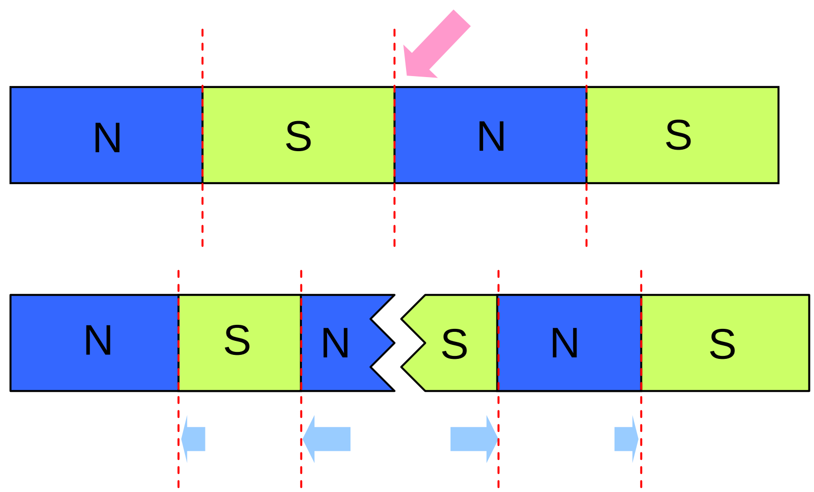
When this magnet is broken into two, it is known that each piece of broken magnets contains both a north and a south pole; isolated magnetic poles are not observed to exist. At the same time, the Line of Zero is shifted (refer to the picture below) with respect to the broken size. This is the simplest explanation of Zero Shifting.



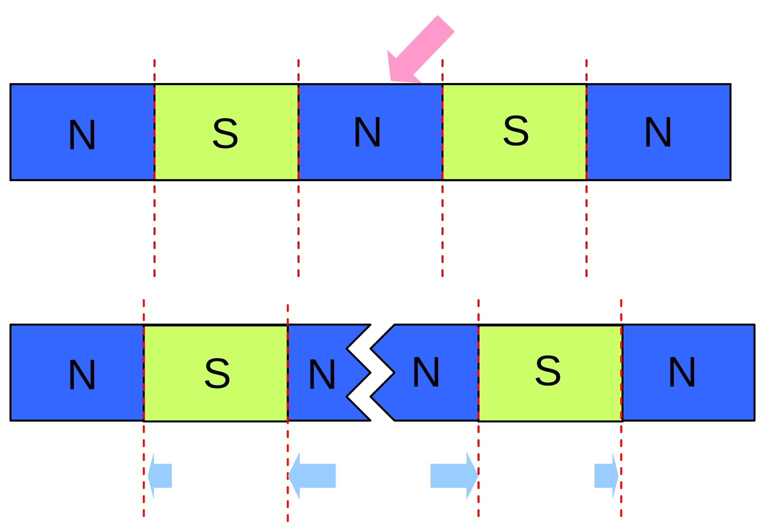
1.8.2.1 Magnet Breaking

It is very simple to understand the Zero Shifting on breaking a piece of two-pole magnet. To understand the Zero Shifting on a multi-pole magnet, just consider the balancing of magnetic of north and south pole after breaking.

Let’s take a look at breaking at the Line of Zero of a four-pole magnet. It is wrong to think that the magnet will be broken into two pieces of magnet with two-pole each. Instead, according to basic explanation being made above, the four-pole magnet will be broken into two three-pole magnets. The Lines of Zero will be shifted towards the outer poles as the ‘tension’ in a four-pole magnet loosens. Though, the position Lines of Zero are not in a balanced condition due to a four-pole magnet that created by a pre-charged method. At this point of breaking, the two broken magnets are able to attract each another back into original unbroken magnet shape (perfect condition).

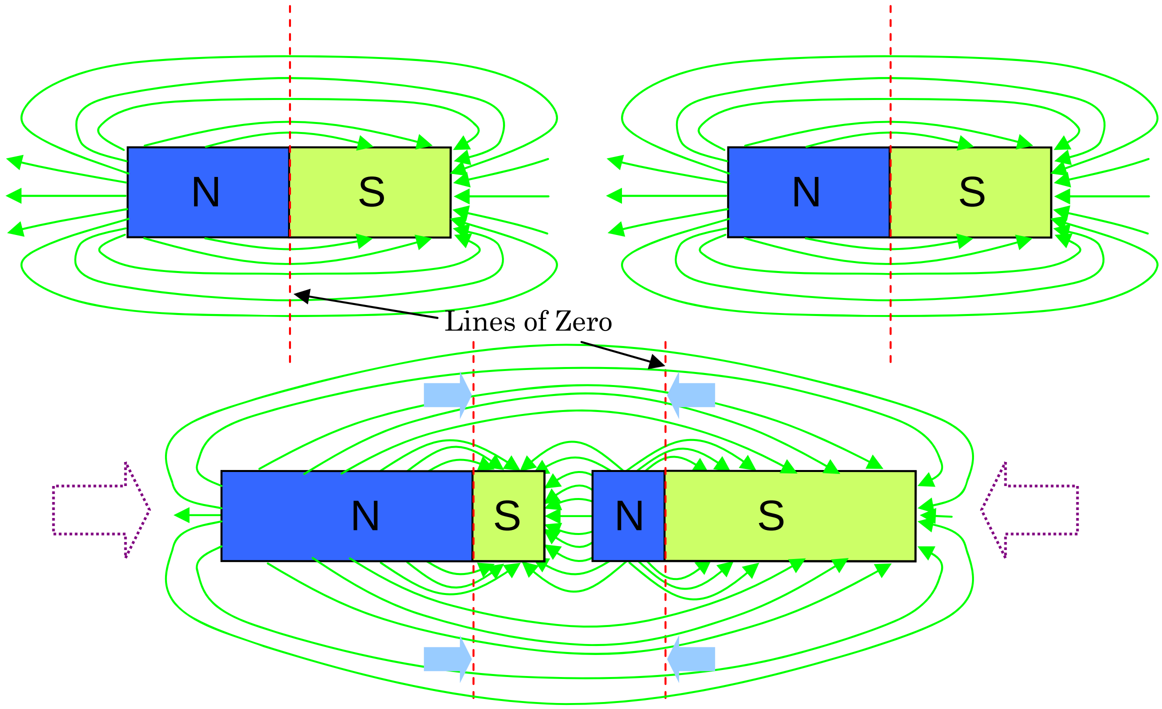


Next, take a look at breaking at the centre of a pole of a five-pole magnet. Breaking at centre of a pole does not create extra pole; a pole is being divied into two weaker similar poles. The Lines of Zero are being shifted towards the outer poles due to same condition explained of ‘tension’ loosen. At this point of breaking, the two magnets repel one another at the broken surface.

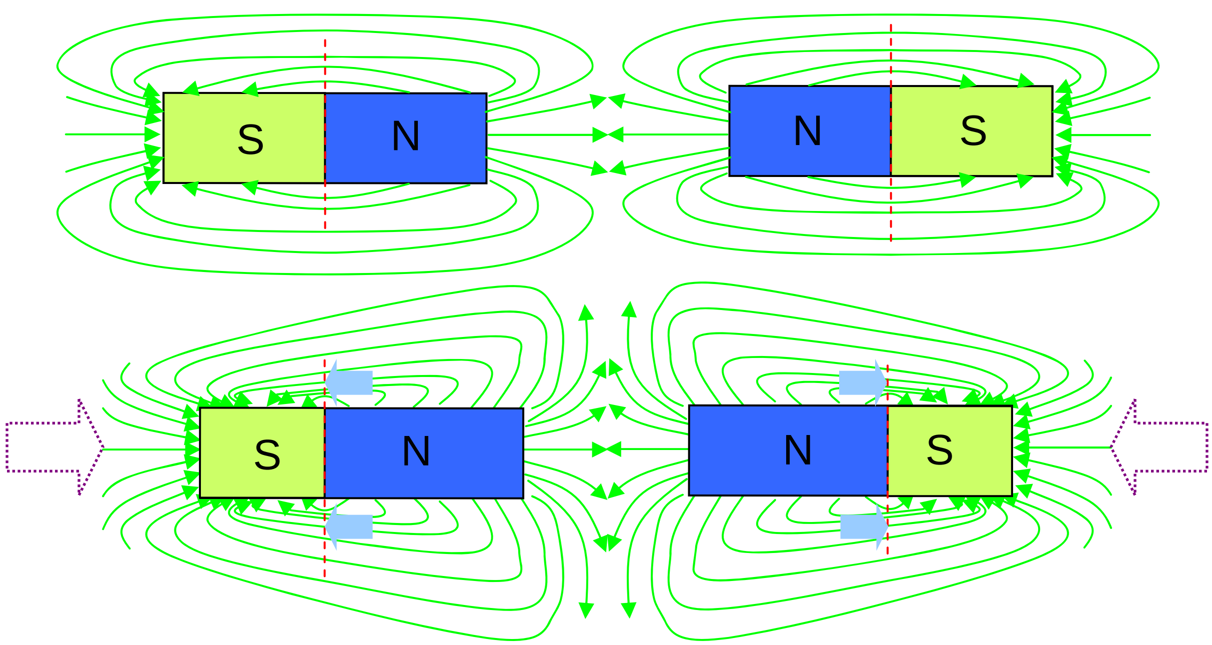


1.8.2.2 Magnet Combining

Place two pieces of similar magnets (unlike poles face to face) together, just like putting two individual circuit of coil together: ALS (1.2.1). Hence the Lines of Zero tend to move towards one another; the magnetic fields of the two magnets tend to synchronise one another.



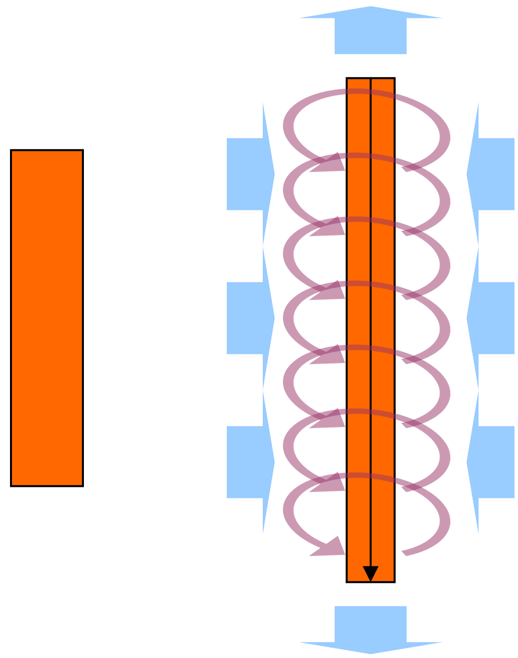
Place two pieces of similar magnets (like poles face to face) together, just like putting two individual circuit of coil together: anti-ALS (1.2.2). Hence the Lines of Zero tend to move away one another; the magnetic fields of the two magnets anti-synchronise one another.



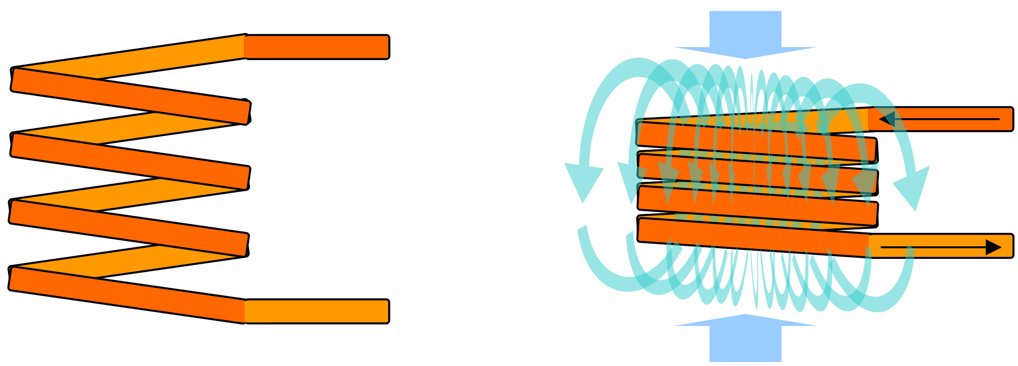
1.9 Magnetic Field Itself

The basic ALS concept in 1.2 is easily understaood. But if we're using soft wires it would be clearer than just understand the concept.

First let's imagine there is a piece of soft wire, a very very soft type, let a strong current conduct through the soft wire from top to bottom. What happen? According to the behaviors described in 1.2, wires with currents of same clock turning direction attract to each other; wires with currents of high magnetic density (flux) repel each other. So with these force being applied to this piece of soft wire, the produced circulating magnetic field, from point of view of same circulation direction, forces the soft wire to become slim; on the other hand, from the point of view of high magnetic density created by the strong current, forces the soft wire to become long.



Next, let's imagine a solenoid with weak spring tension strength, and again let a strong current conduct through the solenoid. According to the same concept in 1.2, parallel CC wires with same magnetic field circulating direction (current direction) attracts each other. Over here, every coil of wires in a solenoid is also in parallel one another, when a current conduct through this solenoid, all coils are producing circulating magnetic field in the same direction, the coils attract one another and hence the solenoid strings.



1.10 Summary of Simple ALS concept

- ALS means the same circulating magnetic field direction of clockwise or counter-clockwise; it does not mean the same (linear) direction.
- The concentric magnetic fields produced of the same circulating direction of two parallel CC wires attract each other. This is the simplest explanation of ALS.
- The concentric magnetic field produced around a CC wire attracts/repels magnet's Synchronisation Point that has the same/different magnetic field direction (clockwise or counter-clockwise):
  - Attracting Point (AP): Attraction takes place when the magnetic field of the Synchronisation Point of a magnet and the concentric magnetic field of a CC wire are in the same direction.
  - Repelling Point (RP): Repelling takes place when the magnetic field of the Synchronisation Point of a magnet and the concentric magnetic field of a CC wire are in the different direction.
- ALS law is applicable to:
  - Fleming's Left Hand Rule / Right Hand Eule
  - Magnetic Induction
  - The Meissner Effect of Supderconductor
  - Mutual Induction
  - Zero Shifting
- Short-terms Used:

  ASR: Amane's Synchronisation Rule

  ALS: Amane's Law of Synchronisation

  AP: Attracting Point

  RP: Repelling Point

  SP: Synchronisation Point (middle of two poles of a magnet). Note: SP is used on magnet with respect to the concentric magnetic field of a CC wire, so there is no SP for a CC wire.

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