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INTRODUCTION OF EDDY CURRENT

EDDY CURRENTS ARE ELECTRIC CURRENTS INDUCED IN CONDUCTORS WHEN EXPOSED TO A CHANGING MAGNETIC FIELD; DUE TO RELATIVE MOTION OF THE FIELD SOURCE AND CONDUCTOR OR DUE TO VARIATION OF THE FIELD WITH TIME.

THIS CAN CAUSE A CIRCULATING FLOW OF ELECTRONS, OR CURRENT, WITHIN THE BODY OF THE CONDUCTOR.

THESE CIRCULATING EDDIES OF CURRENT HAVE INDUCTANCE AND THUS INDUCE MAGNETIC FIELDS.

INTRODUCTION OF EDDY CURRENT BRAKE

EDDY CURRENT BRAKES, LIKE CONVENTIONAL FRICTION BRAKES, ARE RESPONSIBLE FOR SLOWING AND OBJECT, SUCH AS ROTATING MACHINERY, A MOVING TRAIN, OR EVEN A ROLLER COASTER.

THESE BRAKES MAKE USE OF OPPOSING TENDENCY OF EDDY CURRENTS. THE DRAWBACKS OF ORDINARY BRAKES WHICH USES MECHANICAL BLOCKING COULD BE ELIMINATED BY USE OF A MORE SIMPLE AND EFFECTIVE MECHANISM KNOWN AS EDDY CURRENT BRAKES.

THERE ARE TWO BASIC TYPES:

CIRCULAR

LINEAR

CIRCULAR EDDY CURRENT BRAKES:

EDDY CURRENT BRAKE WORKS ACCORDING TO FARADAYS LAW OF ELECTRO MAGNETIC INDUCTION. ACCORDING TO THIS LAW WHENEVER CONDUCTOR CUTS MAGNETIC LINES OF FORCES, AN EMF IS INDUCED IN THE CONDUCTOR, THE MAGNITUDE OF WHICH IS PROPORTIONAL TO THE STRENGTH OF MAGNETIC FIELD AND SPEED OF CONDUCTOR.

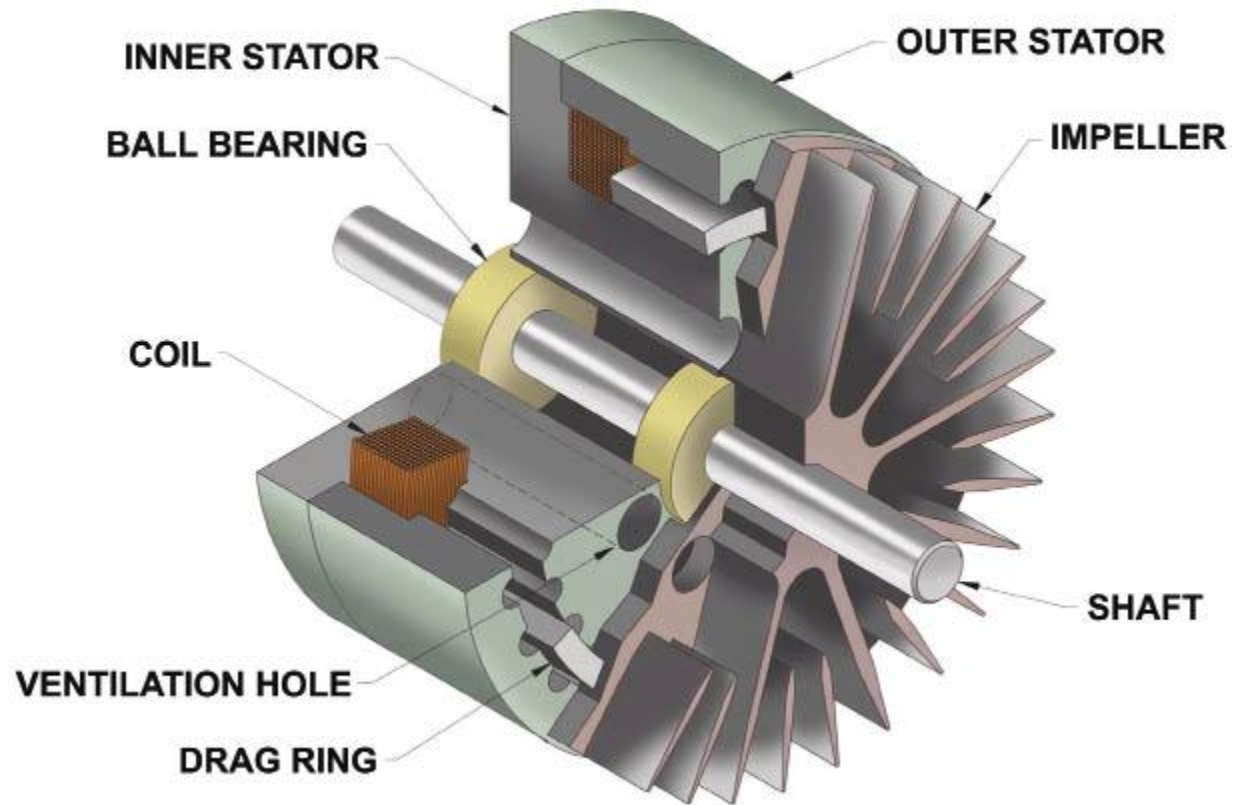
ACCORDING TO LENZ'S LAW THE DIRECTION OF CURRENT IS IN SUCH A WAY AS TO OPPOSE THE CAUSE. I.E. MOMENT OF DISK.

LINEAR EDDY CURRENT BRAKES:

THE LINEAR EDDY CURRENT BRAKE CONSISTS OF A MAGNETIC YOKE WITH ELECTRICAL COILS POSITIONED ALONG THE RAIL.

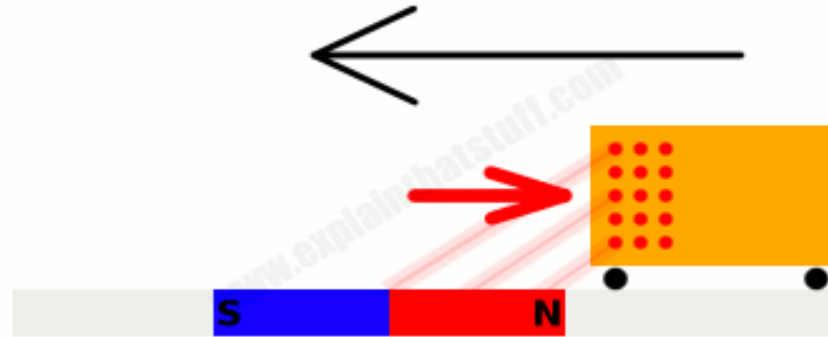
WHEN THE MAGNET IS MOVED ALONG THE RAIL, IT GENERATES A NON-STATIONARY MAGNETIC FIELD IN THE HEAD OF THE RAIL, WHICH THEN GENERATES ELECTRICAL TENSION, AND CAUSES EDDY CURRENTS.

CIRCULAR EDDY CURRENT BRAKES



WORKING PRINCIPLE

HOW DOES AN EDDY CURRENT BRAKE STOP SOMETHING MOVING?

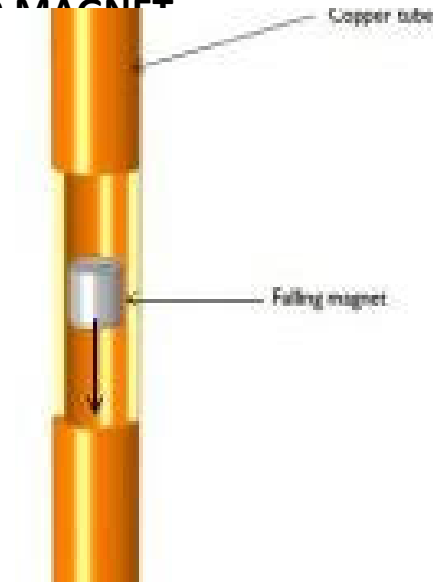


SUPPOSE WE HAVE A HUGE SOLID BLOCK OF COPPER MOUNTED ON WHEELS. IT IS MOVING AT A VERY HIGH SPEED AND WE NEED TO STOP IT.

SUPPOSE WE PLACE A GIANT MAGNET NEXT TO THE TRACK SO THAT TRAIN HAD TO PASS NEARBY.

AS THE COPPER APPROACHED THE MAGNET EDDY CURRENT WOULD BE GENERATED IN SIDE THE COPPER WHICH WOULD THERE OWN MAGNETIC FIELD.

AS THE FRONT PART APPROACHED THE MAGNET EDDY CURRENT IN THAT BIT OF COPPER WOULD TRY TO GENERATE A REPULSIVE MAGNETIC FIELD TO SLOW DOWN COPPER'S APPROACH TO MAGNET



AS THE FRONT PASSED BY ,SLOWING DOWN,THE CURRENTS THERE WOULD REVERSE, GENERATING AN ATTRACTIVE MAGNETIC FIELD THAT TRIED TO PULL THE TRAIN BACK AGAIN.(AGAIN, SLOWING IT DOWN)

THE COPPER WOULD HEAT UP THE EDDY CURRENTS SWIRLED INSIDE IT, GAINING THE KINETIC ENERGY LOST BY THE TRAIN AS IT SLOWED DOWN

COMPONENTS OF EDDY CURRENT BRAKE SYSTEM :

TRACK ROD

AXLE BOX

SUPPORT BEAM

TRANSMISSION LINK

INTEGRAL BEAM

AIR BELLOW

COILS

(1). TRACK ROD :

A TRACK ROD AND STEERING ARM OF THE CAR WERE BENT. THE RACK IS JOINTED TO THE WHEEL HUBS BY TWO TRACK RODS. THE DIFFERENCE IN MOVEMENT OF THE INNER AND OUTER WHEEL IS OBTAINED BY INCLINING THE TRACK ROD ARM.

(2). AXLE BOX :

AXLE BOX IS A BUSHING IN THE HUB OF A WHEEL, THROUGH WHICH THE AXLE PASSES.

(3). SUPPORTBEAM :

IT IS A BEAM WHICH IS PLACED AT WAGONS WHEELS IN TRAINS.

(4). TRANSMISSION LINK :

THIS A LINK PLACED AT THE WAGON WHEELS, WHICH IS USED TO TRANSMIT THE POWER TO WHEELS.

(5). INTEGRAL BEAM :

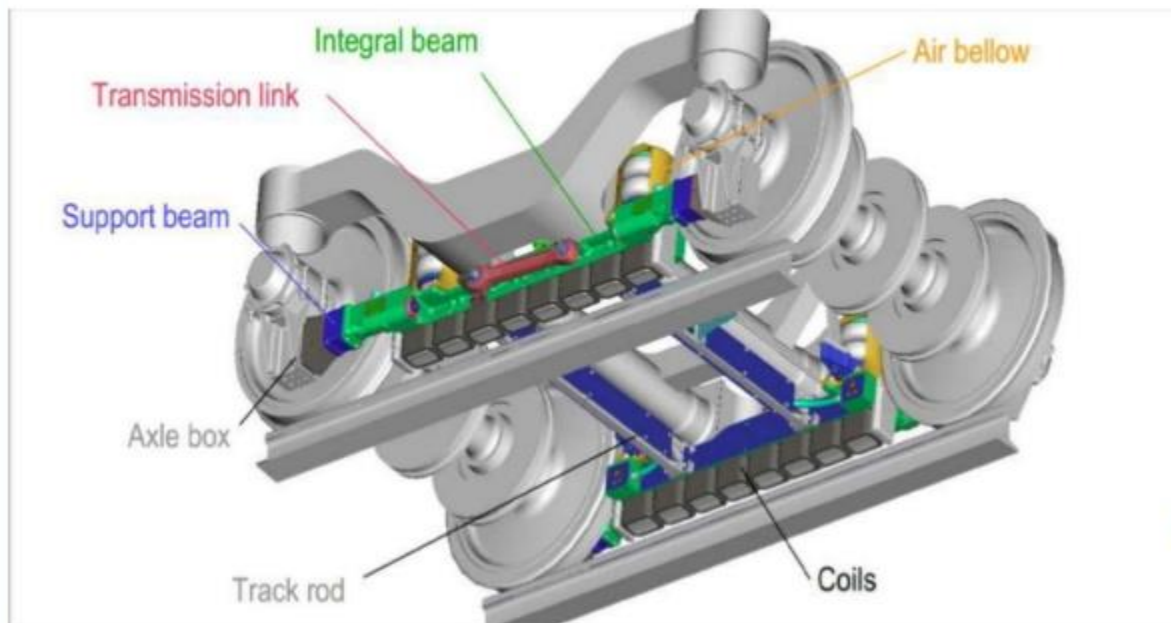
THIS BEAM STRUCTURE IS USED TO PLACE THE WHEELS AT CERTAIN DISTANCE.

(6). AIR BELLOWS :

AIR SPRING IS A RUBBER BELLOW CONTAINING PRESSURIZED COMPRESSED AIR WITH AN EMERGENCY RUBBER SPRING PROVIDING VARIOUS SUSPENSIONS CHARACTERISTICS TO MAINTAIN A CONSTANT BUFFER HEIGHT IRRESPECTIVE OF THE LOADED CONDITION

ARRANGEMENT ECB BETWEEN TRAIN WHEELS

LINEAR EDDY CURRENT BRAKES:



ADVANTAGES :-

IT USES ELETRO MAGNETIC FORCE BUT NOT MECANICAL FRICTION.

NON MECHANICAL.

FULLY RESETTABLE.

LOW MAINTNANCE.

OPERATES AT ANY ROTATIONAL SPEED.

LIGHT WEIGHT.

EDDY-CURRENT BRAKES ARE QUIET, FRICTION LESS AND WEAR-FREE, AND REQUIRE LITTLE OR NO MAINTAINCE

THEY PRODUCE NO SMELL POLLUTION(UNLIKE FRICTION BRAKES).

LIMITATIONS :-

BRAKING FORCE CHANGED WITH PROPOSAL TO SPEED OF VEHICLE.

IT REQUIRES FRICTION BRAKES ALSO FOR EMERGENCY FOR SAFETY ISSUE.

EDDY CURRENT BRAKES CAN ONLY BE USED WHERE THE INFRASTRUCTURE HAS BEEN MODIFIED TO ACCEPT THEM.

IT CAN'T BE USED AT LOW SPEED VEHICLES.

APPLICATIONS :-

FOR ADDITIONAL SAFETY ON LONG DECANTS IN MOUNTAIN AREA.

FOR HIGH SPEED PASSENGERS AND GOODS VEHICLE.

EDDY CURRENT BRAKES ARE BEST SUBSTITUTES FOR ORDINARY BRAKES, WHICH ARE BEING USED NOWADAYS IN ROAD VEHICEL EVEN IN TRAINS, BECAUSE OF THEIR JERK-FREE OPERATION.

IN MOUNTAIN AREAS WHERE CONTINUOUS BRAKING FORCE IS NEEDED FOR A LONG TIME THE EDDY CURRENT BRAKING IS VERY MUCH USEFUL FOR WORKING WITHOUT OVERHEATING.

EDDY CURRENT BRAKES ARE VERY MUCH USEFUL FOR HIGH-SPEED PASSENGERS AND GOOD VEHICALS.

IT CAN ALSO BE USED TO SLOW DOWN THE TROLLEYS OF FASTER ROLLER COASTERS.●

CONCLUSION :-

THE ORDINARY BRAKES WHICH ARE BEING USED NOW A DAYS STOP THE VEHICLE BY MEANS OF MECHANICAL BLOCKING. THIS MAY CAUSES SKIDDING AND WEAR AND TEAR OF VEHICLE.

AND IF THE SPEED OF THE VEHICLE IS VERY HIGH THE BRAKE COULD NOT PROVIDE THAT MUCH HIGH BRAKING FORCE AND IT WILL CAUSE PROBLEMS.

THESE DRAWBACKS CAN BE ELIMINATED BY USING A SIMPLE AND EFFECTIVE MECHANISM OF BRAKING SYSTEM CALLED EDDY CURRENT BRAKES.

IT IS AN ABRASION FREE METHOD FOR BRAKING OF VEHICLES INCLUDING TRAINS.

IT MAKES USE OF OPPOSING TENDENCY OF EDDY CURRENT.

THANK YOU