**Engineering Mechanics**
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**Module - 02**
**Lecture - 01**
**Plane Trusses - I**

We have been looking at equilibrium conditions under positions of bodies. We now wish to apply this to a particular structure called truss.

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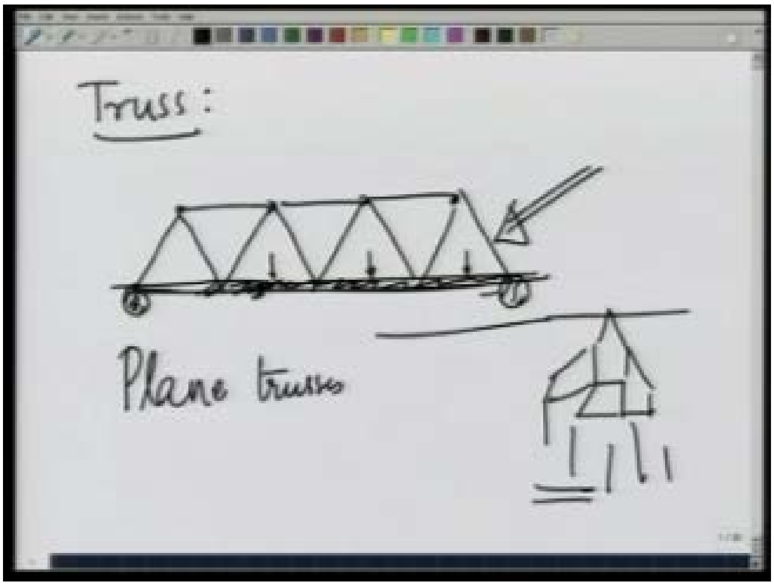


These are the structures they are used to distribute loads and you seen them when you travel for example, across a bridge you see a structure like this and there is the road. This structure helps to distribute whatever load there is on the road and takes it to the sides here. This is known as a truss and in this lecture we wish to analyze the trusses using equilibrium of forces that we have learnt earlier. Another example of truss that you see around is the pillars that carry electric wires that I have this kind of structure and the wires are going like this. These are also trusses.

In this case, this structure is essentially a two dimensional structure. So, these are known as plane trusses and these are 3 dimensional trusses. In this lecture we will be focusing on plane trusses. Before we start on trusses I would like to remind you of a certain things using the force and torque balance conditions that we have learnt earlier. So, let us see what happens when there are only two or 3 forces acting on a system.

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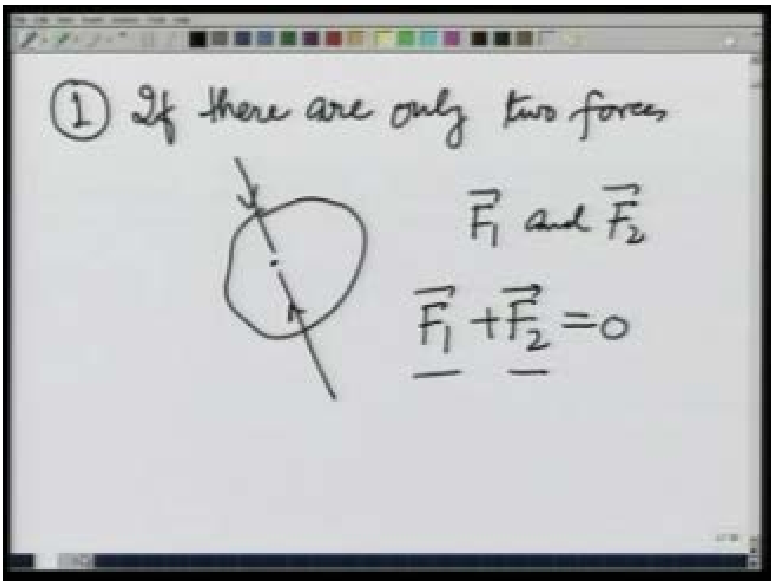


Number one, I am going to looking at if there are only two forces; if a body is in equilibrium under two forces: F 1 and F 2 then, for body to be in equilibrium the forces must be collinear and opposite. So, that F 1 plus F 2 is equal to zero. If they are collinear, then about any point the torque also vanishes if they are equal. So, this is the condition for equilibrium

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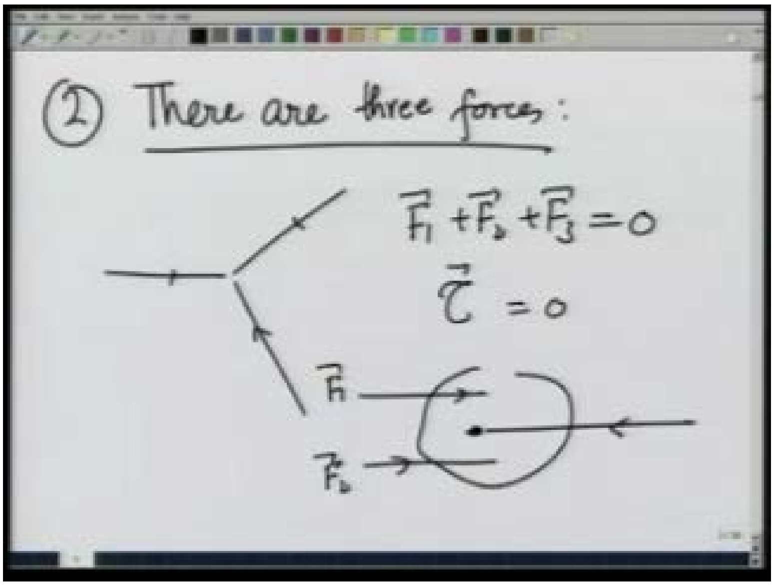


Next, if there are 3 forces in that case the forces should either meet at a particular point so that, F 1 plus F 2 plus F 3 normally is zero. The torque due to 3 forces is also zero.

Another way they can provide equilibrium to a body is if they are parallel. So, two forces could act in this direction and the third force could act opposite. In that case, about any point about this point for example; the torques would be in opposite direction due to F 1 and F 2 and they will balance out. There is something we are going to use later.

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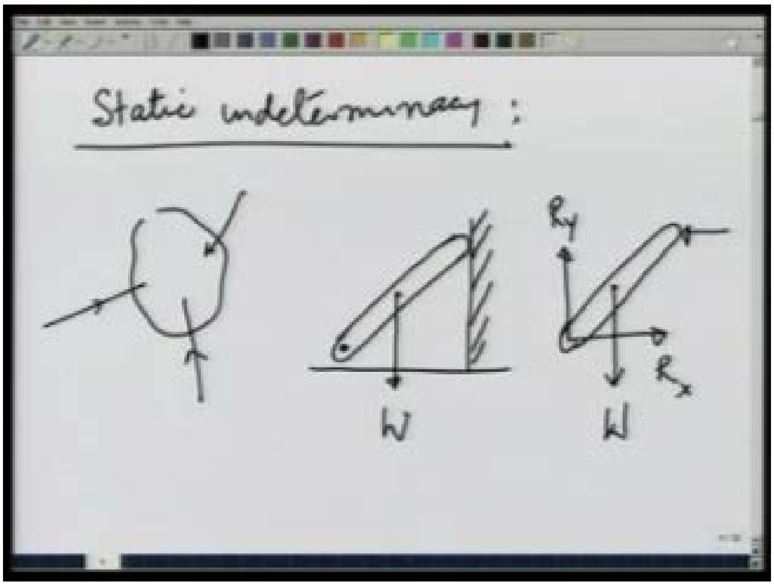


Next, a very important thing let me talk about is Static indeterminacy. If there is a structure or a body and it is in equilibrium under certain forces and constraints which are holding it together. Then if the number of constraints are more than required for it to be for more than minimum required for it to be in equilibrium then, the system is known as the statically indeterminate.

If the numbers of forces number of constraints are just the number that is required to keep it in equilibrium, then the system is statically determinate. In the case of statically indeterminate systems, the extra constraints that we put which may be removed without disturbing the equilibrium is known as the degree of indeterminacy. This is all illustrated very well with an example.

Let us take, a rod which has the pin joint at the lower end and let us say it has weight W. For yet to be in equilibrium under this weight it will have to be supported on this side by say a wall and that is enough to ensure equilibrium. Because in this case if I look at the free body diagram of the rod, it will have a force acting down which is weight. There is a norm; there is a reaction in the y direction due to the pin. One in the x direction due to the pin and there is normal reaction on the wall. These forces are sufficient to bring this rod in equilibrium let us see how.

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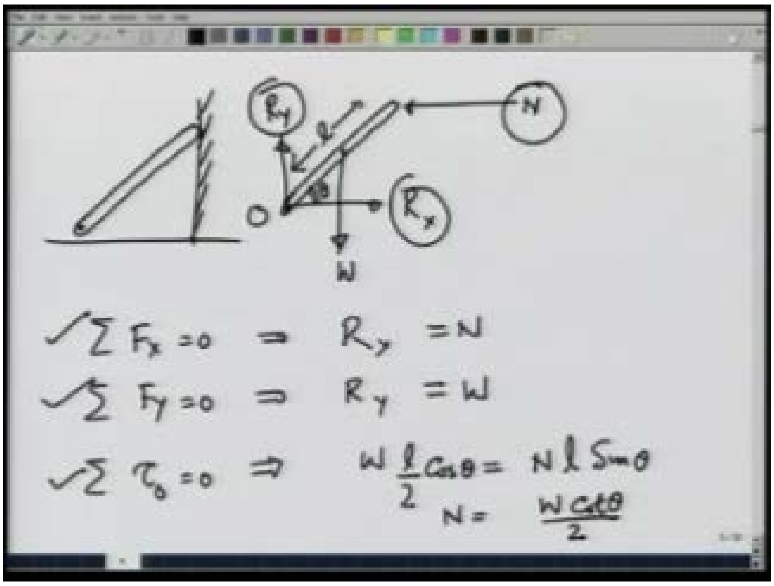


So, I have this rod the pin joint here and a wall here, this has a force RY RX normal reaction due to the wall and its weight. The equilibrium condition summation FX equal to 0 gives RX equals N, summation FY equal to 0 gives RY equals to W. Now, about this point; the lower point this is pin joint is o, the torque also must be balanced. If this angle is theta, the length is l then we have summation torque about o is equal to zero. Gives, W time's l over two cosine theta is equal to N time's l sin theta or N equals W cotangent theta divided by 2.

Notice that, in this problem I have 3 unknowns N, RX and RY emphasize 3 equations: one, two and three. So, I can determine each and every unknown exactly this problem is statically determinate Let us look at indeterminate; corresponding indeterminate problem.

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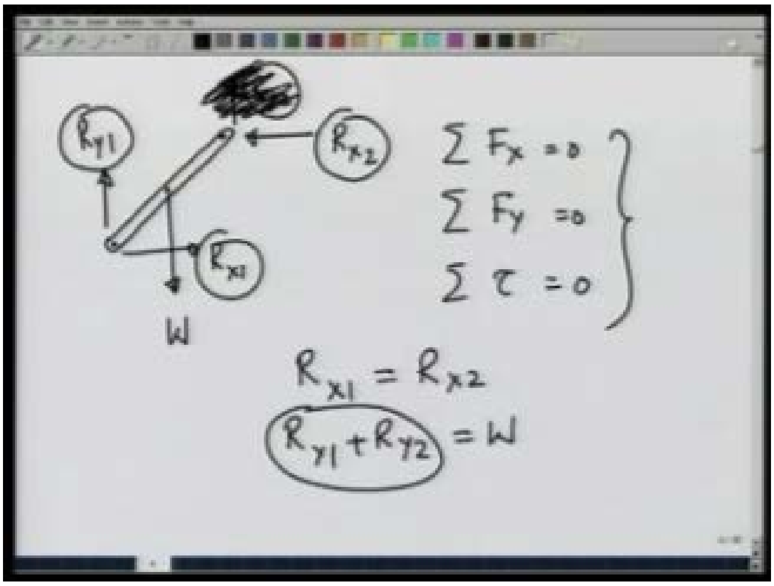


If I take, the same rod and put a pin joint here and also a pin joint here. In that case, this is the weight W I will have RY 1 and RY RX 1 on the lower pin joint, RX 2 and RY 2 on the upper pin joint. In that case, you see that numbers of unknowns are 4; RX 2, RY 2, RY 1 and RX 1. And numbers of equations are still three: summation FX equals zero, summation FY equal to 0 and summation tau about any point is zero. So, I am putting an extra constraint here by providing a vertical force in the upper pin also.

The conditions I get are that, RX 1 is equal RX 2 according to the various shown directions, RY 1 plus RY 2 equals the weight and third condition is the torque condition. You see all I can determine through this is RY 1 plus RY 2, not RY 1 and RY 2 individually and this is the degree of indeterminacy. So, this is statically indeterminate problem and degree of indeterminacy is one because, I can remove this constraint or providing a vertical force and still keep the system in equilibrium.

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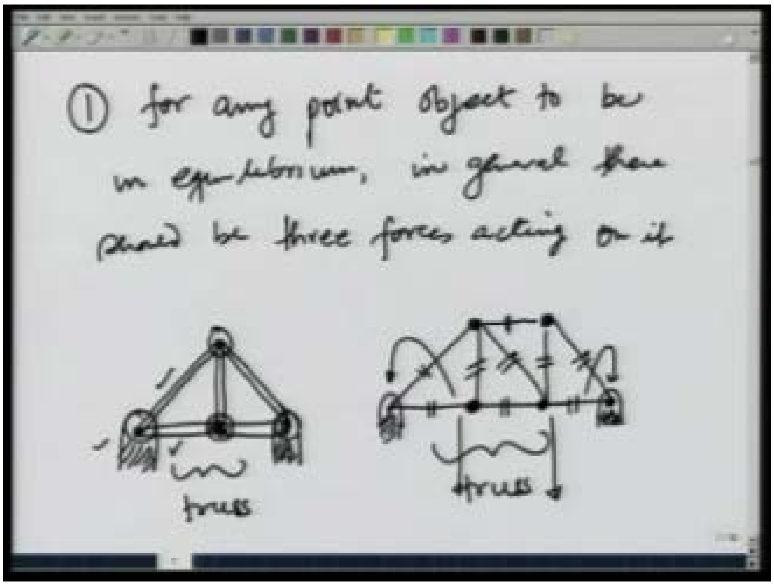


Now, to motivate the trusses I know 2 points: Number 1 for any point object to be in equilibrium, in general there should be 3 forces acting on a minimum of 3 forces. And therefore, if I want to make a structure where, each joint is equilibrium I should provide 3 forces there. There could be one external and two by something else or 3 members extending for applying forces.

For example, let us take a structure where I take a rod and make a pin joint at one end of it and suppose I want to load it at a particular point. Let me first make a structure of 3 taking 3 rods and provide a pin joint at the circles. Now, you see this pin joint has 3 forces acting on it: 1 by this member, 1 by this member and one external force. So, this is can be equilibrium. However, this joint and this joint are not acted upon by 3 forces and therefore, to make the structure may these points come under equilibrium I have to provide more forces.

I could do that by providing one more rod here which provides 3 joints to this whether 3 members 3 forces to this point and then make 1 rod here. So that, this point is also under 3 forces and make a joint here. However, the moment I do that, this joint is only under 2 forces I have 2 choices: either provide a full support here or another choice and I will make it in simple manner now; 1 joint here, 1 joint here, 1 joint here. This is a fixed joint here we earlier provided a joint a fixed joint. But now, I will put another rod here another member and make a fixed joint here.

All over the moment I do that, this joint will not be in equilibrium because this is acted upon only by two forces: 1 by the fixed joint and other by this rod. So, I have to provide one more member to make; to bring this point into equilibrium. The moment I do that I have one free end of this member here, which also has to be brought to into equilibrium. I could provide 1 rod this way, 1 rod this way and this entire structure would be an would be capable of remaining an equilibrium.

This is a truss; a plane truss so is this. So, you see if I keep making the structures like this, I would provide at each point enough forces to keep that point in equilibrium. If I load this structure somewhere I can provide, I can load it the some weight here I could load it here. Each point is now, can be brought into equilibrium by forces generated in these members; these members both provide just the sufficient forces to bring this entire structure into equilibrium and in the process transfer this load on to the fixed supports. This is the job of a truss.

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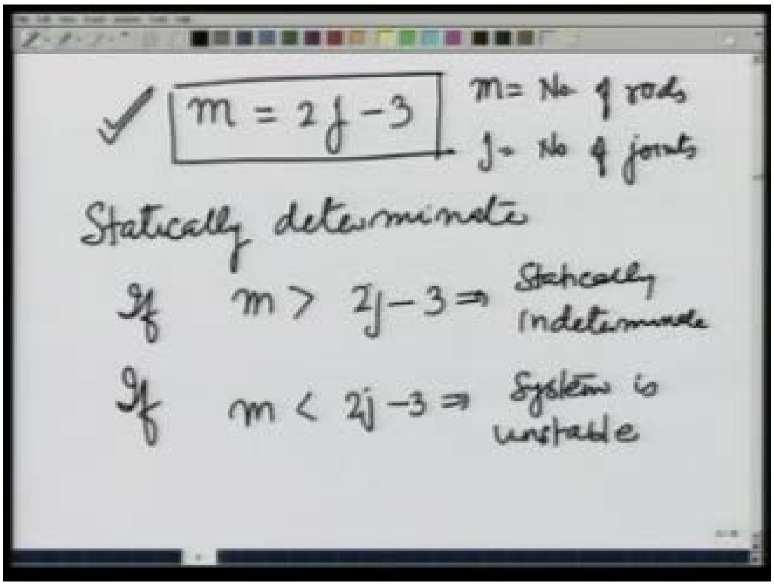


If you analyze it carefully, you will see that the number of point number of members that I need to do this is equal to, let me write the number of members equal to m is equal to 2 j minus 3. In this case, I provided just enough constraints in the system to make the system statically determinate. If m is larger than 2 j minus 3; where, j is the number of joints and m is the number of members, let me write it here m is equal to number of these rods let say. And j is number of joints, then the system becomes statically indeterminate I have provided more constraints than are needed.

If on the other hand; so, this is statically indeterminate. On the other hand if m is less than 2 j minus 3 then, the system is unstable. I have not provided enough constraints or enough members or rods to provide enough forces to keep the system in equilibrium and therefore, the system may collapse. So, to make it statically just write number to make it statically determinate I need, m members in the in a truss with m being equal to 2 j minus 3 where j is the number of joints in this. Let us understand how this condition comes about.

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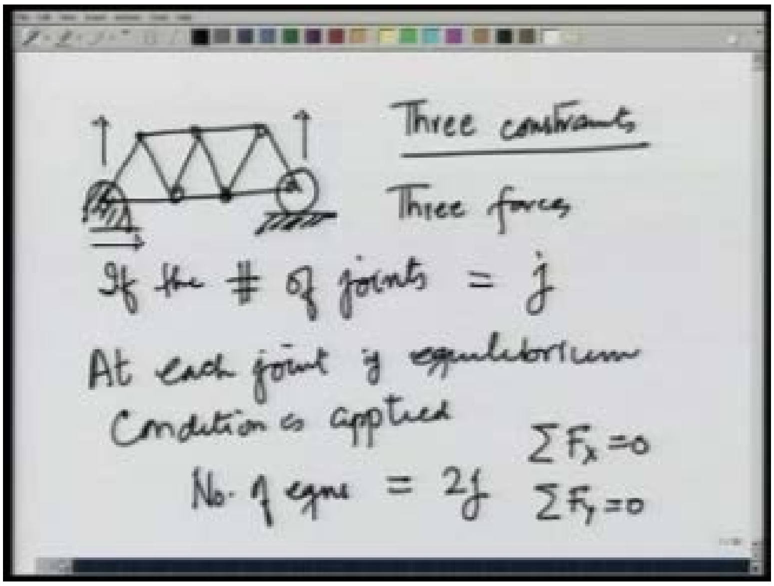


So, if I take a truss which is externally statically determinate; that means, it has 3 constraints from outside, 3 constraints could be in the form of 3 forces, 2 forces, 1 torque or whatever, So, let us take 3 forces and then if the number of joints is equal to j then a at each joint, if equilibrium condition is applied. Then we have number of equations equals to 2 j because, at each joint since it is a point there will be only two equations summation FX equals 0 and summation FY equals zero.

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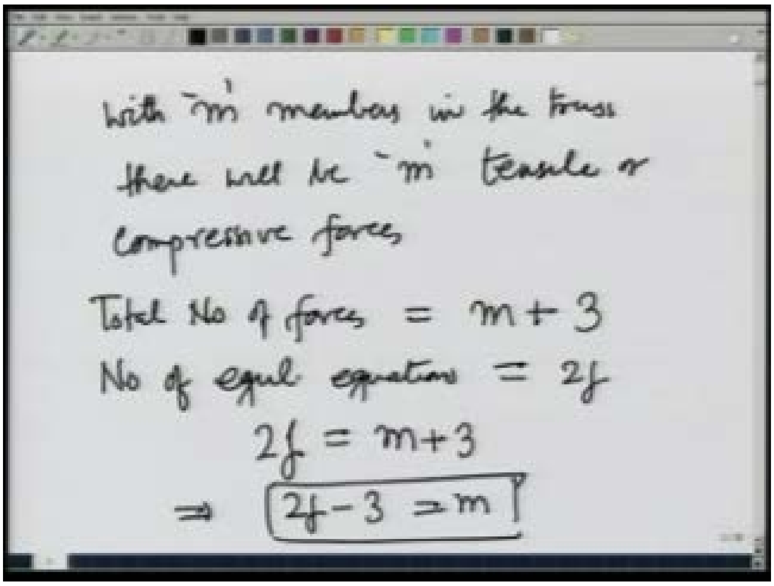


And as we saw earlier with m members in the truss, there will be m tensile or compressive forces. So, total number of forces is equal to m which are arising from the members of the truss plus 3 external forces and number of equations equilibrium equations counting two for each joint is equal to 2 j. If I should be able to solve for all the forces then, the number of equations should be equal to number of unknowns; which gives me 2 j minus 3 equals m. And that is the equation for statically determinate trusses if, the trusses are externally statically determinate.

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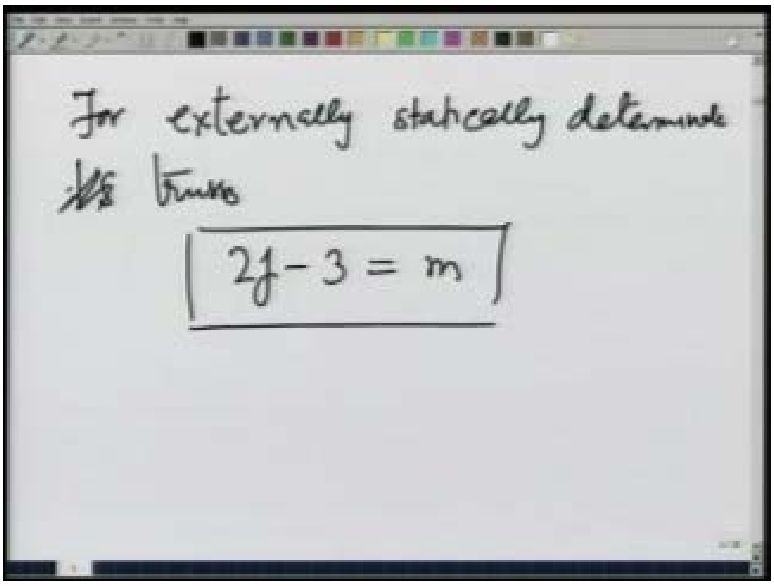

So, for externally statically determinate trusses 2 j minus 3 equal's m and that is how we get this equation. Let us see, the structures that I made earlier whether they satisfy this or not. So, let us see the first structure that I made was this one (Refer Slide Time: 10:32) and second was this one let us see that.

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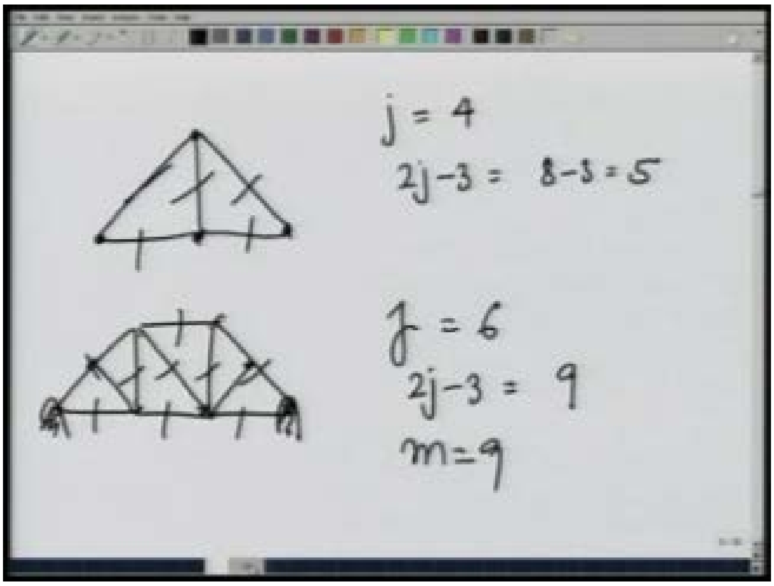


So, the first structure that I made was like this, number of joints is equal to 1 2 3 4. So, 2 j minus 3 is equal to 8 minus 3 which is equal to 5 and I have precisely 1 2 3 4 5 members, this is a statically determinate structure. The other structure that I made was like this, the number of joints here is equal to 1 2 3 4 5 6. And therefore, 2 j minus 3 is equal to 9 and I have 1 2 3 4 5 6 7 8 9 members. So, this is also a statically determinate structure.

If I add more rods may be like this, may be like this although I am choosing number of joints. So, at some point it may become a system which is statically indeterminate On the other hand if I have less numbers the 9 then, it will be a structure which may collapse; it will not transfer forces in a easy manner or a consistent manner to the sides. You notice that both the ends are put on a fixed point actually; this makes the system indeterminate because, the number of external forces is now 4. We could make it determinate by putting the right hand side of the system on a wheel or on roller. Let us take one example of this. This is a very particular structure that I am taking.

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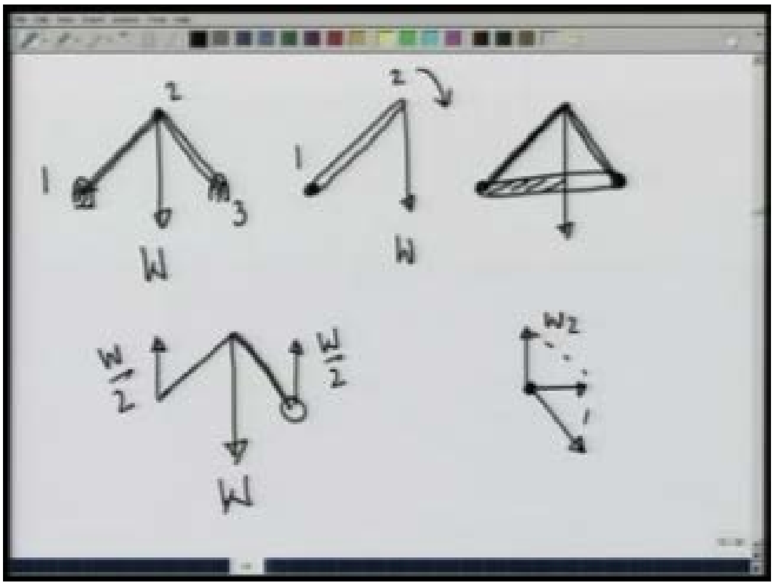

let us take, 2 rods I am making it very very carefully which are fixed joint here, fixed joint here, one joint here and I am loading it right here. This is just to again motivate and play around with forces and things like those in a truss Now, you see if I start with this rod let me call this, 1 2 3; start with rod 1 2 put it on a pin joint here and load it. Rod will tend to rotate like this, to stop that what I do is I put another rod here. So that, this an isosceles triangle and make a fixed joint on the other side also and then the load is here.

But, the moment I do that you see if I look at this structure as 1 there is a load W. There will be reaction here and in this case I know because the symmetry is going to be W by 2 here also, the reaction is going to be W by 2. And if I look at this pin here from those supports fixed support outside it is getting a force W by 2 like this and it is being pushed by this rod in this direction. So, the net force on this will be in this direction it will not be in equilibrium. To bring it to equilibrium I add another rod here and that makes a stable truss for me. In this particular situation where, this is an isosceles triangle and I put the load on this joint.

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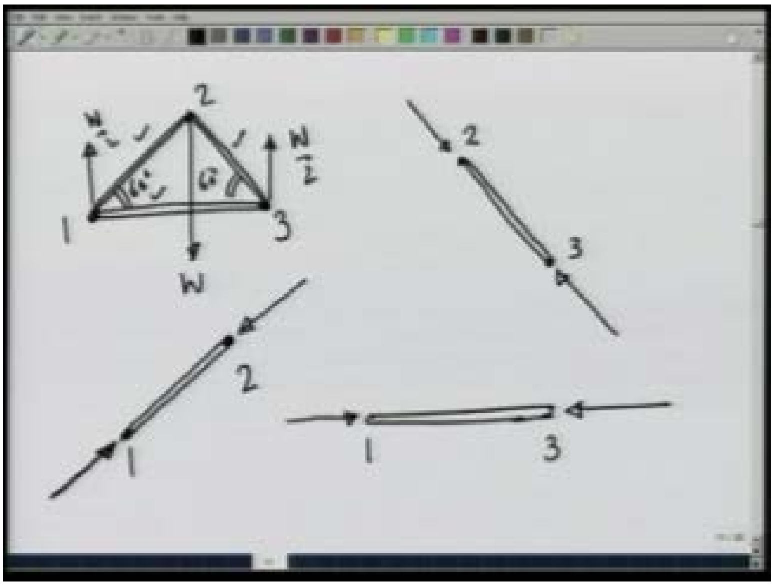

Let us analyze this further. So, I have this structure here and I have already argued that I need these 3 rods to bring it, make it a stable structure. If I look at this system, there is a force W by 2 W by 2 acting here and force W acting downwards. What I want to know is, what is the force is and these different rods or members of the system? So, let us call this 1 2 and 3; let us look at rod 1 2. If I look at rod 1 2 it is in equilibrium under the forces that are applied on it by this pin here and this pin here, only two forces.

I remember what I said in the beginning of the lecture at if a body is in equilibrium under 2 forces those forces are collinear So, in this case there will be a force on this acting this way and there will be force acting on it this way at these two points. This is the only way these two forces can act otherwise the body will not be in equilibrium. Similarly, on rod 2 and 3 there are 2 forces acting due to pin at 2 and pin at 3 again, the forces have to be collinear. So, the forces have to act in this manner 2 and 3 and on the rod 1 and 3 again 1 and 3 is an equilibrium the rod 1 and 3 is in equilibrium. So, the forces at 1 and 3 have to be collinear.

Because, if a body is in equilibrium under two forces; they have to be collinear. So now, you know the force directions, let us analyze this further if all the rods are equal then all these angles will be 60 degrees.

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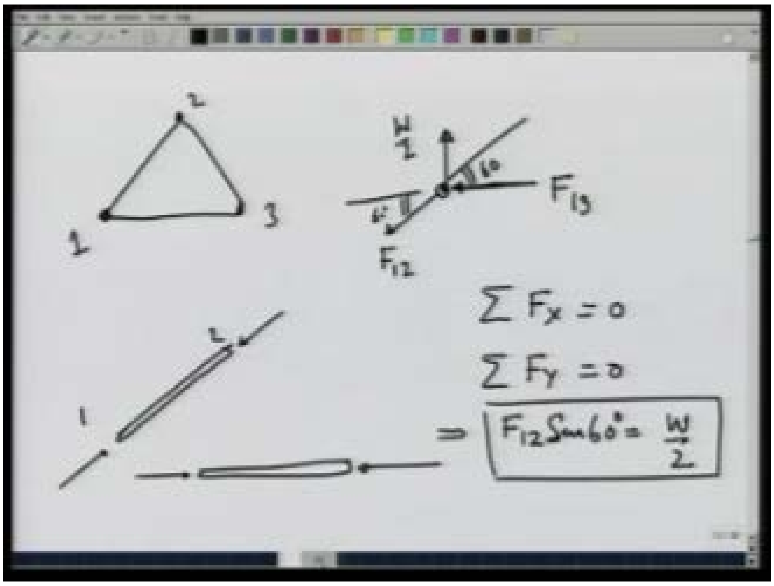


Now, I know that pin 1 is an equilibrium pin 1 has a force acting on it which is W by two since for the rod 1 2 I made forces that are pushing the rod. So, the rod would be applying a force the other way on the pin. Similarly, force on 1 3 that I made also pushing the rod that is the force is compressive, the force that will be acting on the pin would be in opposite direction. So, let me call this force 1 3 this is force 1 2 and this pin is in equilibrium under these forces.

Since, the forces are acting at one particular point I do not have to write the torque equation. Only thing I will write is that, summation FX would be equal to 0 and summation FY would also be equal to zero. This gives me that F 1 2 this is 60 degrees. So, would be this. So, F 1 2 sin of 60 degree is equal W over 2 and that gives me F 1 2.

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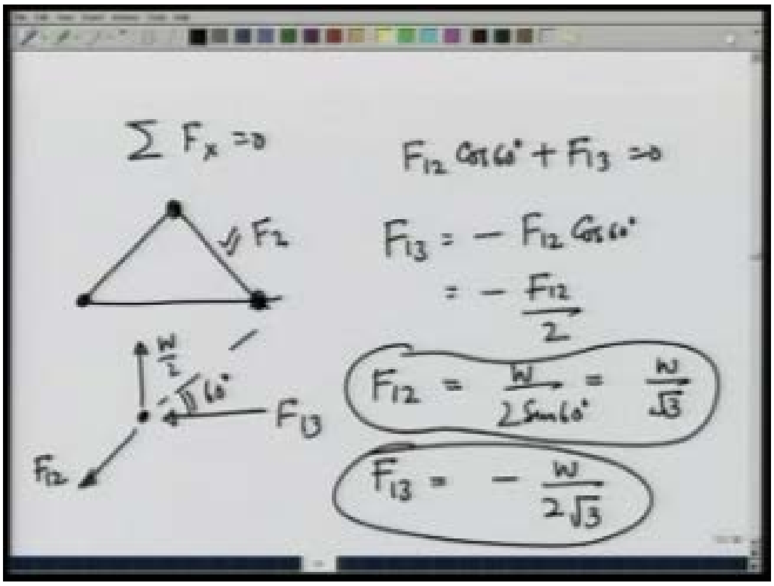


Similarly, summation FX is equal to 0 I recall, that I am talking about this pin on this pin there is a force this way F 1 3, F 1 2 and W by 2 this angle is 60 degrees. I am going to have F 1 2 cosine of 60 degrees plus F 1 3 is equal to 0 or F 1 3 is equal to minus F 1 2 cosine of 60 degrees which is nothing but, minus F 1 2 over 2 F 1 2 on other hand we found out this equal to W over 2 sin of 60 degrees which is nothing but, W over root 3. And therefore, F 1 3 is equal to minus W over two root 3. I found the forces on member 1 3, I found the force on member 1 2. To find the force on the third member that is F 2 3, I have a choice either I can go to this point or this point and consider the equilibrium conditions there.

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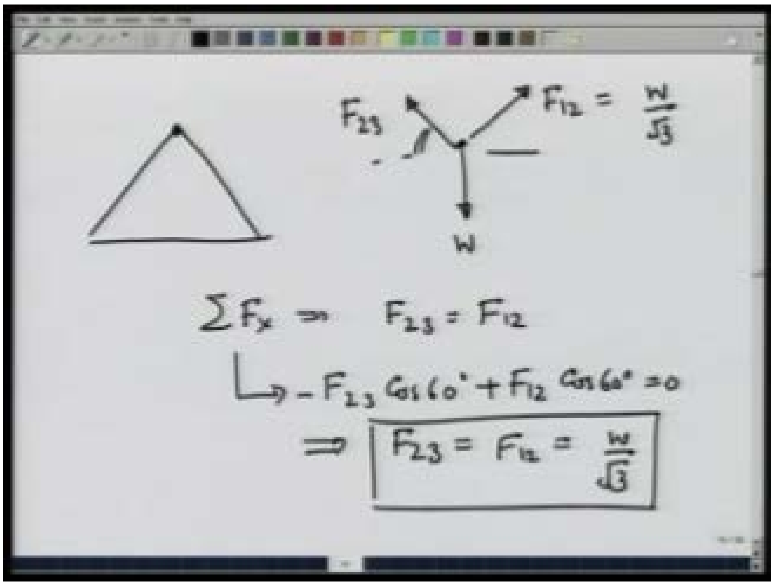


If I go to point 2 here, then according to the way we made forces point two would be feeling a force this way which is F 2 3 a force this way which is F 1 2 which we have already determined to be W over root 3 and a force this way which is W. Now, summation FX then gives you that F 2 3 should be equal to F 1 2 of course, this comes with F 2 3 this angle is 60; cosine of 60 degrees with the minus sign plus F 1 2 cosine of 60 degrees is equal to zero. And this gives you at F 2 3 equals F 1 2 equals W over root 3. So, we have determined all the forces in the system by looking at equilibrium of each point.

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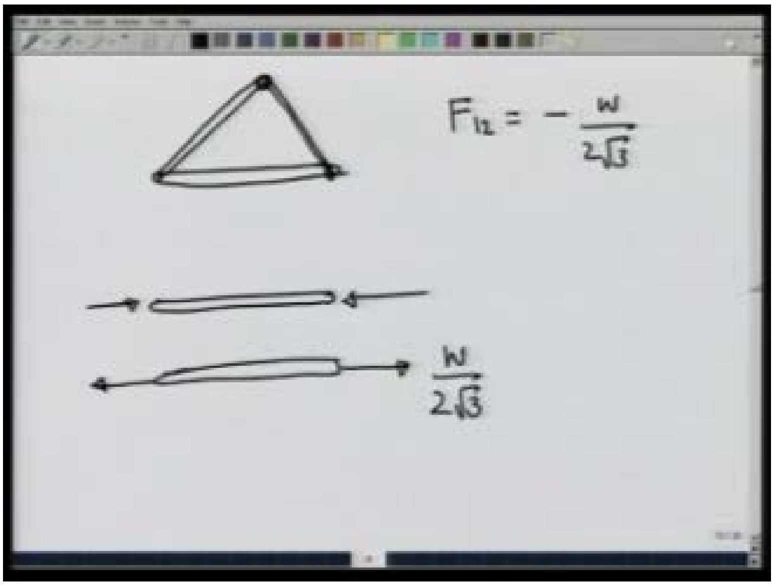

One point I would like to make about F 1 3 is that, F 1 3 came out to be negative what; that means is that, the direction that we had assumed for F 1 3 that is. We had assumed for F 1 3 that is we had assumed it to be like this, the compressive force is actually not so it is a tensile force that is the rod F 1 3 is being pulled in this manner with force W over 2 root 3.

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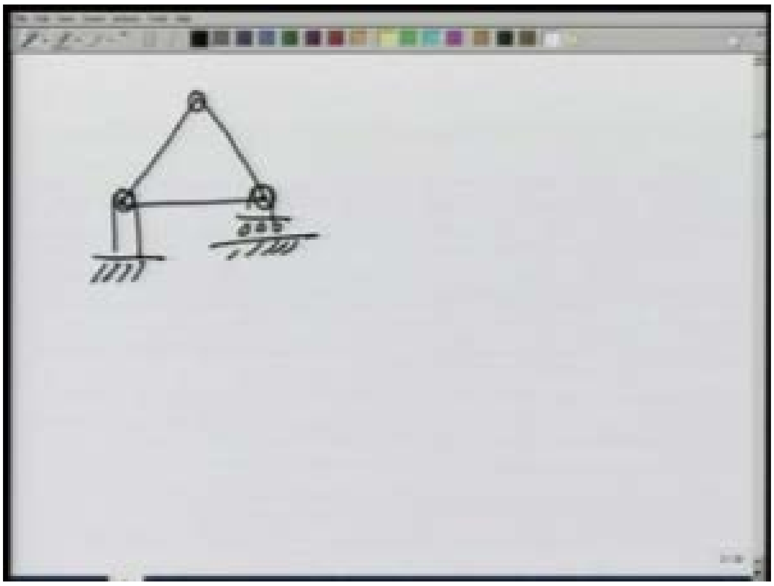

For completeness I should point out that the triangle that we just made should actually we fix like this, on a fixed pin on the left and on a roller or wheel on the right. This will make the system statically determinate. Through this, what I have done is provided you an example of solving for the forces in a truss, through method of joints. That at is we take each joint, each pin at each joint to be in equilibrium.

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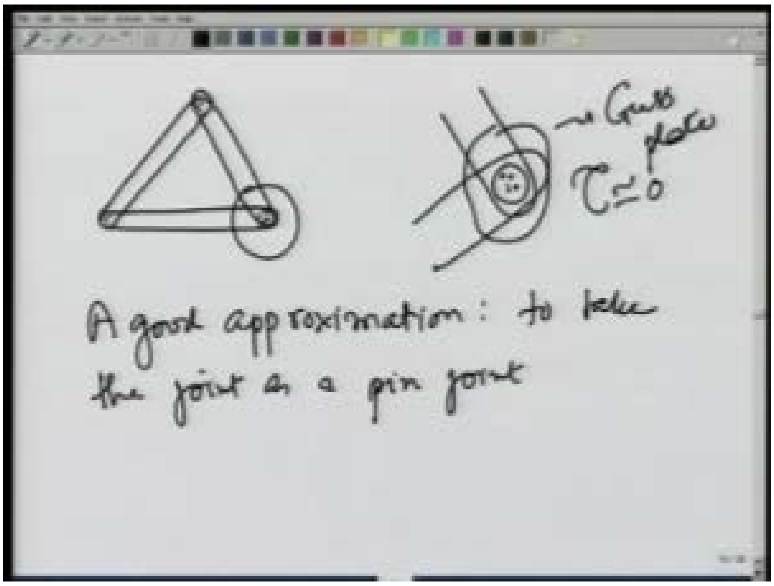


Now, if you settle points about trusses if I take these 3 rods and replace them by slightly wider members with the width of the member being much smaller than their length and instead of applying a pin joint borrow them here mould them here by plate. That is each joint here looks something like this and I put a plate here with bolts here. Even then, it is a good approximation to take this as a pin joint. So, a good to take the joint as a pin joint why because, the width is very small and therefore, even if they are still forces that are applied by these bolts, the torque produced would be almost 0 negligible compared to the torques that applied by external forces.

And therefore, it is got approximation by that the plate that is put here you notice it next time when you cross a bridge is known as the Gauss plate.

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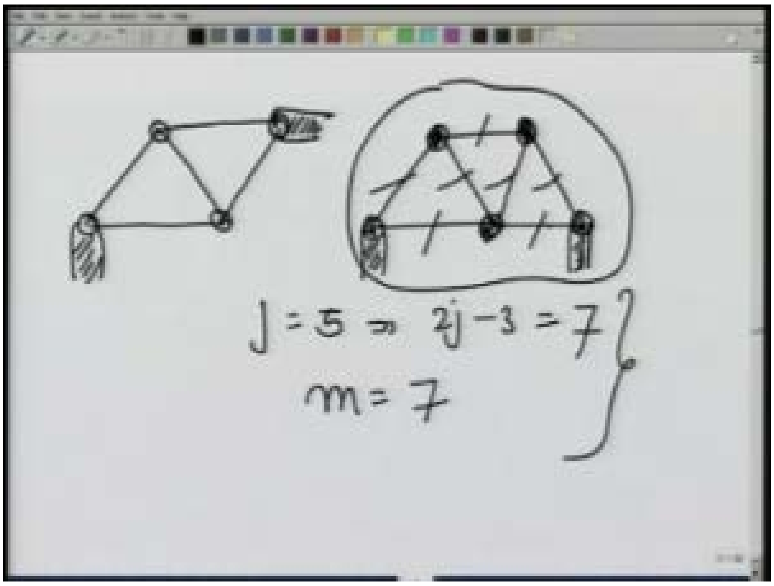


So, let us see now given a basic truss like this which I just solved for, how can I make a bigger truss. Let us see, if I want to extend this further or apply I put a member here and give a joint here this joint now has 3 members; that can provide equilibrium. Then this point suppose I do not want to provide a support here. I have to provide one more member and I will provide a fixed support here a fixed support here, that is one possible truss.

Another way is I have this basic truss which is fixed here fixed here I do not want to fix it here now I provide one more member. So, that this point now has 3 members that can provide equilibrium to it this is a fixed point. And suppose I want to put this under a fixed point then, this member has 1 force coming from the fixed support one from this member. So, I have to provide one more member so that there are 3 forces acting on it.

But, this gives a loose end here I could fix this loose end by putting two members here. Now, you see each member has a minimum of each joint has a minimum of 3 members so that, this becomes a statically determinate structure. Let us see if it is, number of joints in this case is 1 2 3 4 5. So, j equals 5 implies 2 j minus 3 is 7 and 1 2 3 4 5 6 7 members and therefore, m which is seven provides that this is a statically determinate structure. This is capable therefore, of remaining equilibrium when loaded.

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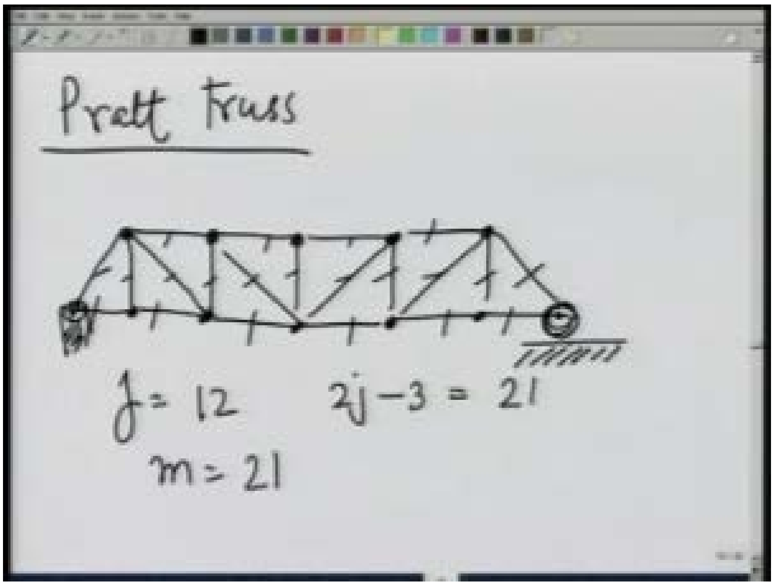


Several examples of trusses, that you see everyday life are example: Pratt truss which you see; Pratt truss which is like this put on the supports here and these are joints. Let us see, the number of joints here are 1 2 3 4 5 6 7 8 9 10 11 12 12. So, 2 j minus 3 is 21 number of members is 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21. So, this is a statically determinate truss and capable of remaining in equilibrium. These points can be fixed on the other side, I either I can have a fixed pin or usually you put it on a wheel. I will comment on this a little later let us look at some other trusses in the mean time.

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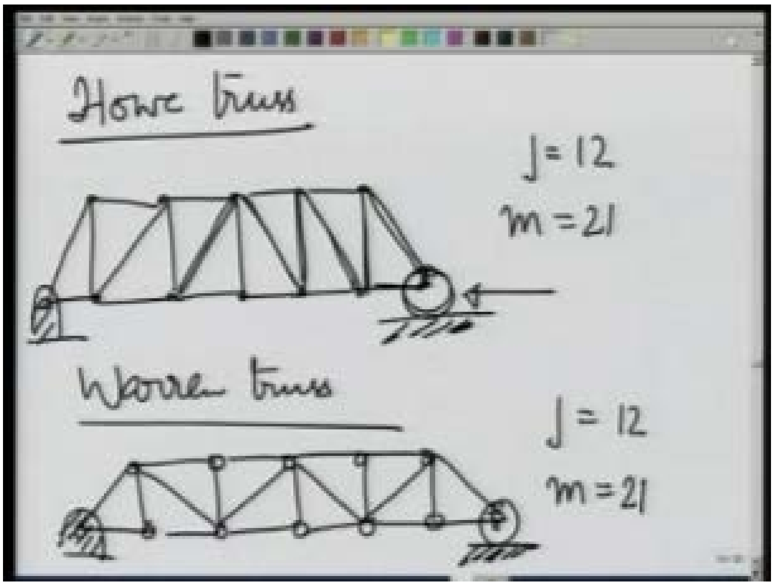

The other one is Howe truss which is like the Pratt truss; except that the fixtures are the other way. Again, you can count the number of joints and number of members they are consistent for it to be a statically determinate truss. Third one is a Warren truss which is like this. So, these are different variations on the way the members and joints are fixed on a truss and this side again I put it on a roller and this side is fixed.

Again, j equals 12 and m equals 21; so they are consistent j equals 12 and m equals 21. So, they are also consistent for them to be statically determinate trusses. Why we put a wheel here or a roller here is because, what we assumed in all these is that these members are rigid members. However, in reality they deform and when they deform them the distances may change and to accommodate for that we put a roller here or then putting it on a fixed pin joint so that, this trusses are not developed in these members.

Notice, that even when the wheel is put instead of a fixed joint, the trusses capable of remaining in equilibrium since there was a redundant constraint on the system to start with.

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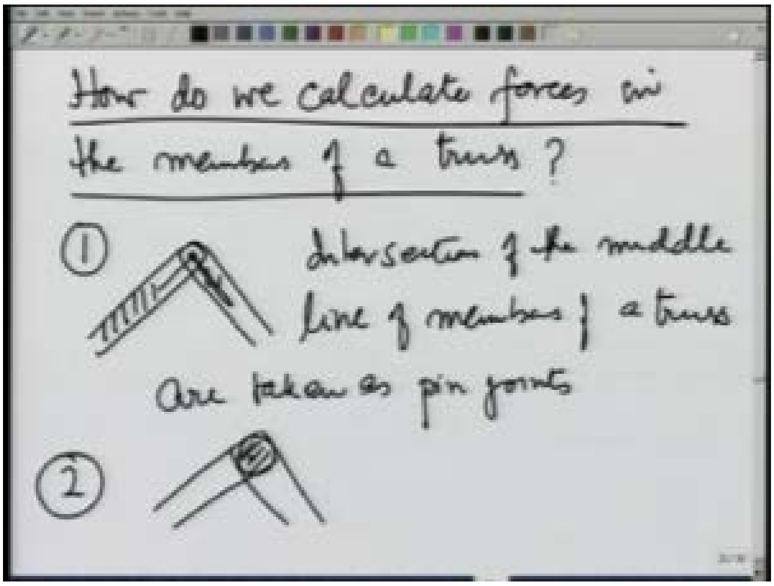


So, the question that we now I want to answer is how do we calculate forces in the members of a truss? And that will be analyzing the trusses. We are going to restrict our self to plane trusses which are the one that I showed you and we are going to do our analysis under certain assumptions. Number one when these members which we take to be sort of rods, but are wide enough, when the middle line where ever it cuts we want to take that intersection as a pin joint. So, intersections of the middle line of members of a truss are taken as pin joints. And as a corollary, where also any plate or bolting that can be done here we ignore the torques arising because of that.

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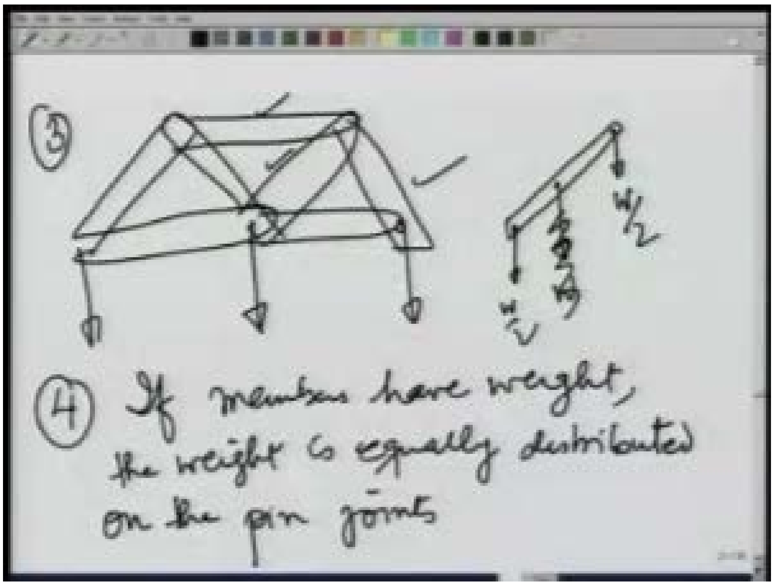


Next, we are going to assume that it any truss all the load is going to be only on the pin joints, that is the next assumption. And finally, if a member that is these rods have weight; weight is equally distributed on the pin joints. That is if for example, a member may have a weight W then I am going to say that this pin joint bears W by 2, this pin joint also bears W by two of this weight. So, the weight is equally distributed on the pin joints under these assumptions we analyze the trusses.

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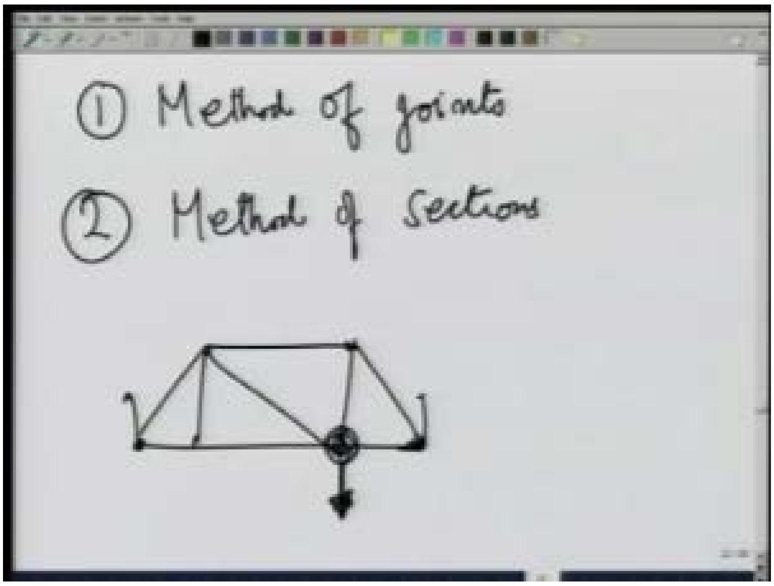


There are two methods of analyzing the trusses and getting their the forces on various members: 1 is known as a method of joints and the other 1 is known as the method of sections. You already seen a glimpse of already got an glimpse of method of joints when I analyzed a very simple truss earlier. What it what is done in the method of joints is that, each point each joint of the truss is brought in equilibrium under the applied forces. So, if I have a truss like this and it is loaded here then we start with the point where the load is.

And see how that point is in equilibrium that gives us the forces in the various members that are connected with that point; in terms of the applied load. In case you have more forces then you can solve for in this this case. Then you go you first solve for the reactions at fixed points and then because they are only two members have those fixed the end fixed points. You can solve for the forces in those members and then go on to the next joint and so on.

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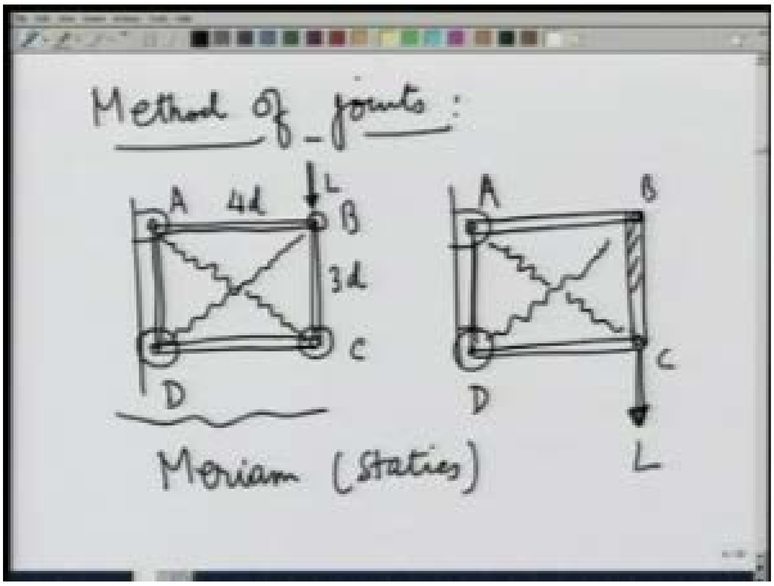


This I am going to demonstrate, the method of joints of joints through several examples: as a first example, let me take a system a simple system which is made of 4 rods. One fixed pin joint here this is a rod another rod like this the pin joint here, third rod like this and this is on a roller a fourth rod like this. And there are two ropes along the diagonal let me call this system A B C and D. This length is 4 d this length is 3 d and we load the system once at point B by load L and another loading is done, at point C same L either two ropes A B C and D.

And both the cases I want to know the forces developed in these rods or members and these ropes. I should also mention here that this problem is taken from the book of Meriam; this is quite a nice problem because teaches us quite lot of things in one problem.

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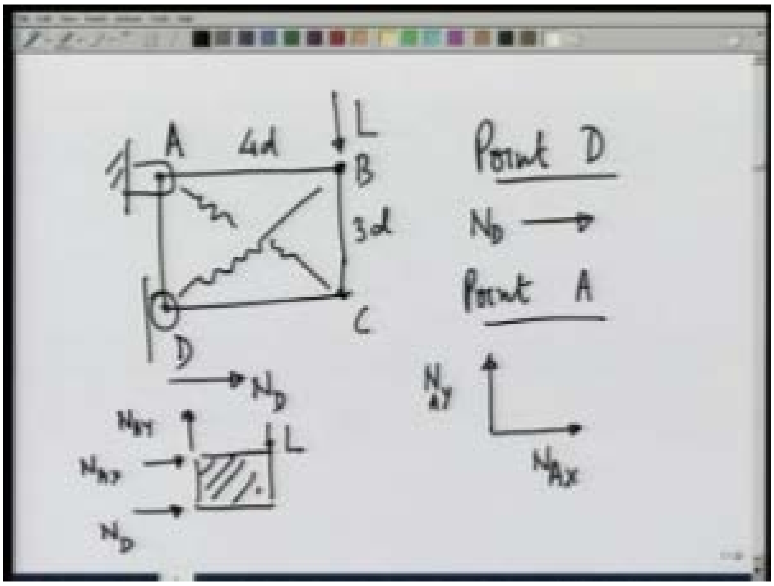


So, let us first take this particular case where we have just make it very simple manner. These points this is on roller this is on a fixed pin this is a rope this is a rope this is a load this is 4 d this is 3 d. Now on the point this A B C D, on point D there will be only the reaction in the horizontal direction let me call it, ND on the entire system. So, ND in horizontal direction on point A there is going to be a reaction in the vertical direction let's call it NY NAY and horizontal direction NAX.

This is if I consider the entire system as a whole. So, on the entire system if I make a free body diagram, there is a load L there is a reaction here ND, there is a reaction here in the vertical direction NAY and other reaction here in horizontal direction NAX. Since there are only 3 external forces ND, NAX and NAY these can be determined very easily it is a 2 dimensional problem.

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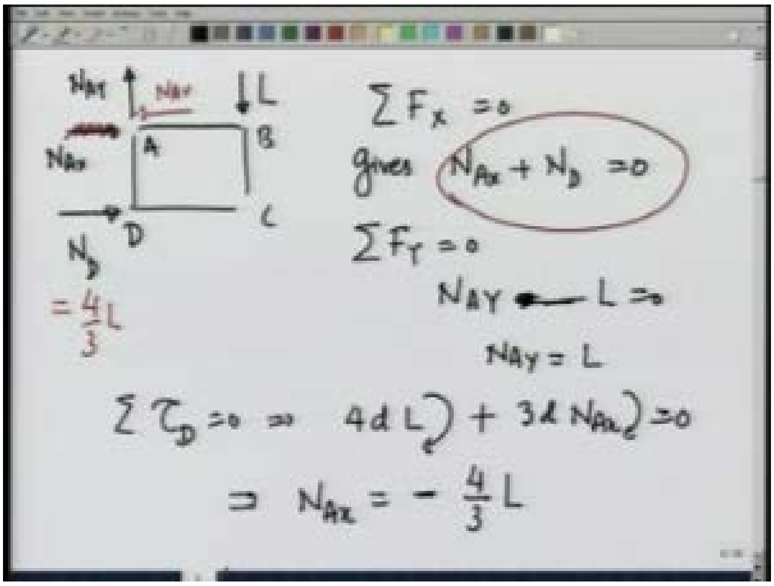


So, let me make it again there is a load L, ND, NAX, NAY summation FX equals 0 gives NAX plus ND equals 0 and summation FY equals 0 gives NAY equals minus L I should write NAY minus L equals 0 or NAY equals L thus it is vertically upward direction. Summation torque, about D this is point D A B C is equals to 0 gives 4 d times L clockwise plus 3 d times NAX also clockwise should be 0.

And this implies that, NAX equals minus four-thirds L and minus sign tells you that its direction let me make the good direction with red should be this way. So, this is NAX and from this equation that NAX plus ND equals zero ND also comes out to be in the right direction four-thirds L.

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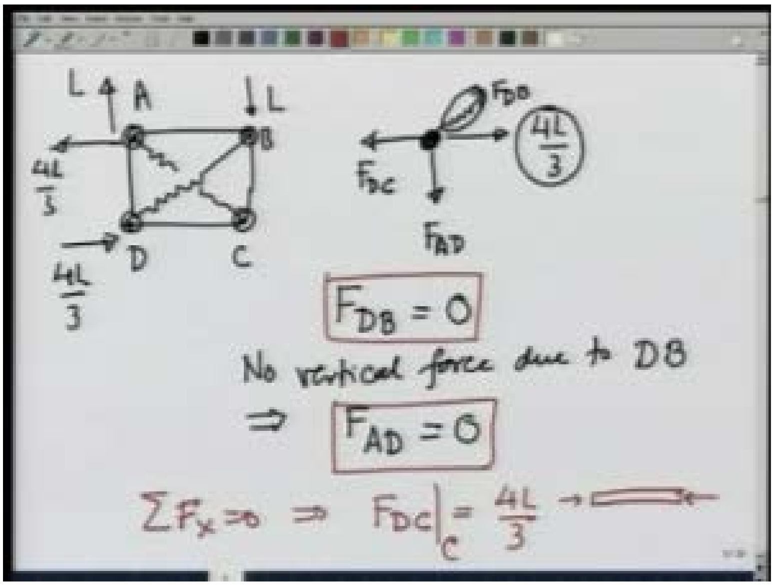


So, now we know the forces external forces. In the system what we have is L here at point C, point A I have a force acting towards left 4 L by 3 force acting towards vertically up L I have a force acting on this joint in this direction 4 L by 3 and I want to calculate other forces. This is point, C this is point D. Let us take, the joint D or the pin at D and C what the forces on D are now, we are really using method of joints each joints we are going to bring equilibrium by applied forces.

At point D the force in horizontal direction 4 L by 3 there is a force and now I am anticipating that the force by rod DC is going to be towards left F DC. There is a force by the rope now since, this is a rope it can apply only a tensile force; I mean the rope can exist only under tension not under compression. So, it will not support a compressive force. So, it can apply only a force in this direction F let us call it DB and there is a vertical force due to rod FAD. Now, one can see that this joint is under a force four L by three. So, this is going to be pushed to the right and if it is going to be the pushed to the right, the rope is also going to be pushed in; but rope cannot sustain any compressive force.

So, FDB is going to be 0 if FDB is going to be zero; that means, there is going to be no vertical component of force due to element DB this also implies that, FAD is equal to zero. So, we found two forces FDB which is 0 and FAD which is 0. Let us now, consider the forces in the horizontal direction since FDB is 0 summation FX equals 0 gives me

FDC equals 4 L by 3. And positive sign tells me that I have already; I have found the correct direction since the rod is pushing rod DC is pushing the point out the rod DC is under compressive forces. So, this is compressive force let us move on.

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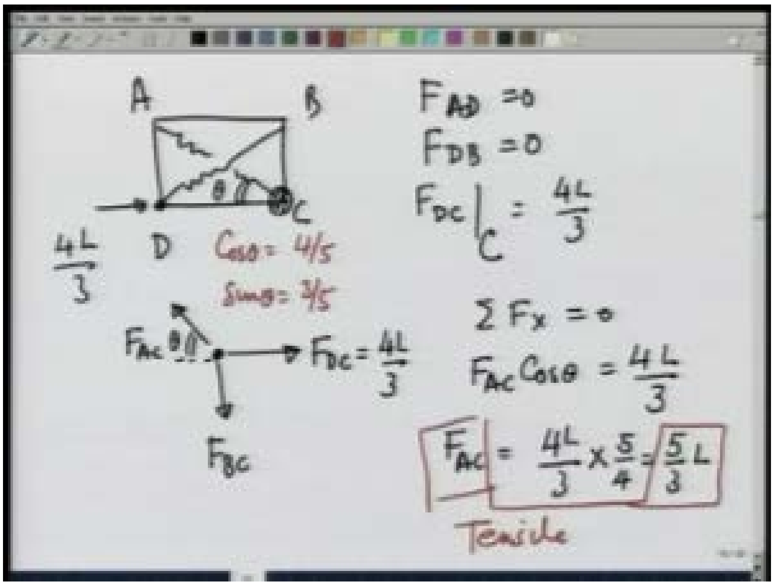


So, what we have found in this that at point D there is a force 4 L by 3 and A B C D FAD is 0, FDB is 0, FDC is compressive 4 L by 3. Let us now, look at point C point C is under a force FDC which is 4 L by 3. There is a force and I am already anticipating right direction FAC pulling at N; that means, AC rope is under tension remember again AC is a rope. So, that it can support only tension no compressive force.

And there is going to be a force FBC this angle is this theta this is theta. So, that let me write in different colour cosine of theta as four-fifths and sin of theta is three-fifths. So, summation FX equal to 0 on point C gives me FAC cosine of theta equals 4 L by 3. So, FAC is equal to 4 L by 3 divided by cosine theta. So, that is 5 over 4 and this gives me 5 over 3 L, that is the tension; tensile force on the rope. Now, similarly if I do summation FY.

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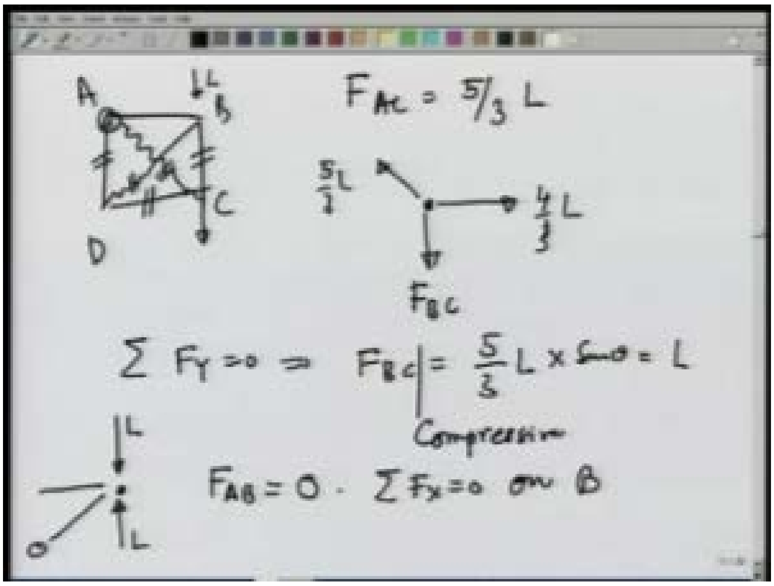


So, again let me make the picture A B C D, we have found FAC to be five-third's the load this is the load at point C this is five-third's the load, this is four-third's the load. And this force is FBC summation FY equal to 0 gives me FBC equals five-third's L time's sin of theta. Sin of theta we have already calculated its three-fifths and therefore, this comes out to be L. So, FBC is pushing it down and; that means, FBC is the rod is being compressed; so is compressive.

So, we found force FDC, we found force FBC, we found force FAC, we found force FAD, we found force on FBD. The remaining forces are forces only on FAB. Let us now look at point B the joint B is under load L then, it is being pushed by FBC by L. There is no force 0 force due to the rope and therefore, FAB comes out to be 0. This follows from the condition summation FX equals 0 on B. So, now, we found all forces and let us see again by checking at point A weather all the force are consistent.

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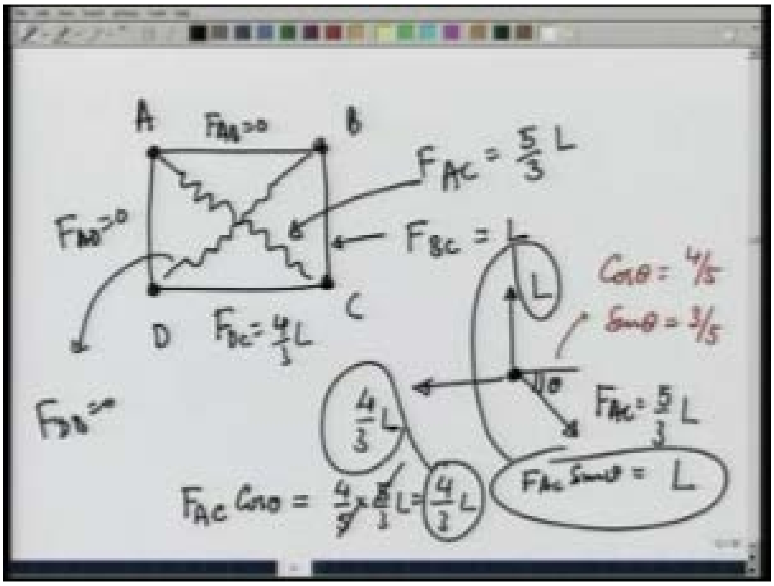


So, what we have found on this frame A B C D FAB is 0, FAC is five-third’s L, FDC is four third’s L, FBC is equal to L, FAD is equal to 0 and FDB is equal to 0. With these forces let us see if point A is under equilibrium. Remember we found that on A there is a force in this direction which is four-third’s L there is a force upwards which is L. And now, I know because of the tension in the rope there is force FAC which is five-third’s L; this angle is theta.

Recall again that cosine of theta is four-fifths and sin of theta is three-fifths if everything has been solved correctly, point A again should be in equilibrium. So, FAC cosine of theta comes out to be four-fifths times five-third’s L which is four-third’s L and this force is going to balance this force out. So, horizontal forces are 0 and FAC sin theta comes out to be three-fifths times five-third’s L, which is L and this force is going to balance out this particular force. And therefore, point A is in equilibrium and we have solved the problem correctly got.

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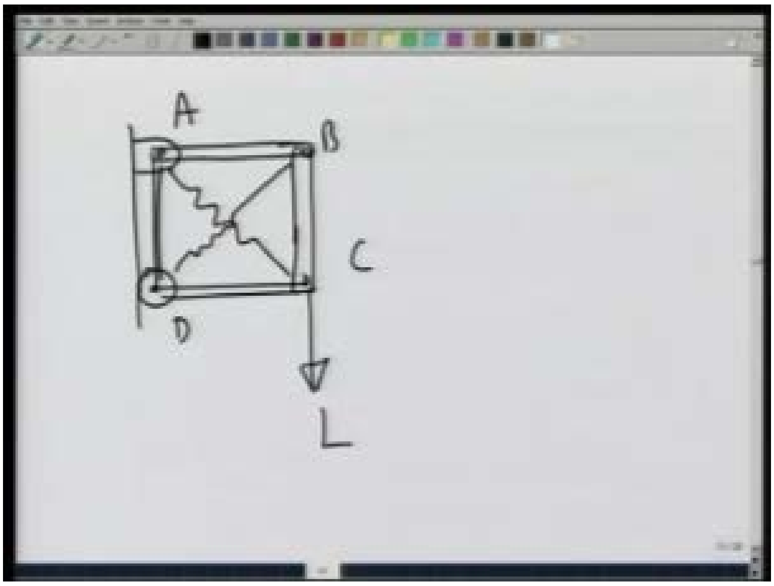


For the second part where the system is loaded differently that is, the load is at point C I leave this for you to work out. In the next lecture, we will be taking slightly more complicated and bigger examples and see how method of joints helps us in solving the problems for trusses.