**Lighter-Than-Air Systems**
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**Lecture - 58**
**Descent Following Exceedance**

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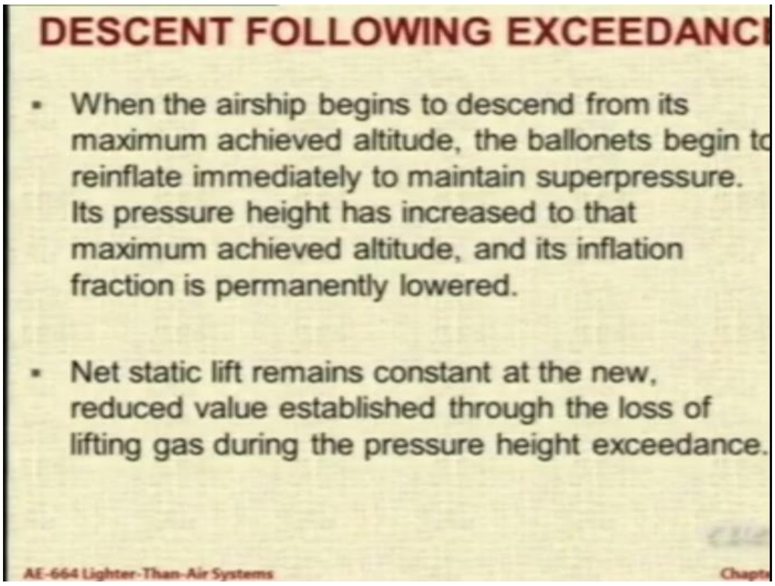


Now let us look at a situation when the airship has exceeded the pressure altitude and then it starts descending. So, this is an operational issue. There is no numerical calculation here, just observe carefully and try to understand the physics behind what is happening. So, you have reached the maximum achieved altitude and now you are descending. As you descend the ballonet will start collecting air. Why?

Because they have to maintain the superpressure, otherwise you will excess superpressure. So, as you start going down from that particular condition you will reach an altitude earlier. So, the net static lift will remain constant at the new reduced value because of the loss of lifting gas. So, what happened now is you will loss lifting gas, therefore you are going to lose some lifting capacity. The lifting capacity comes mainly from lifting gas.

So, you are coming down after exceeding the pressure height. So, if you do not have enough lifting gas, you have thrown it away to be able to go to that height. As you come down, slowly the ballonet starts getting filled up.

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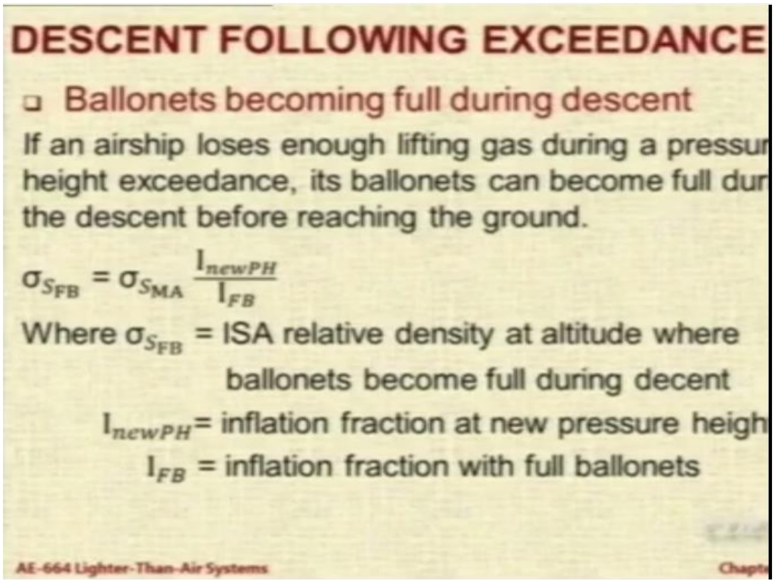


So, as I said what will happen is that the ballonet will become full during descent. Before hitting the ground, the ballonet will become full. But now you are stuck up in the air. You cannot come down further because to come down further you need to have more air in the ballonet, but ballonet has not space, houseful. So, you cannot come down. So, this is the inflation fraction the new condition.

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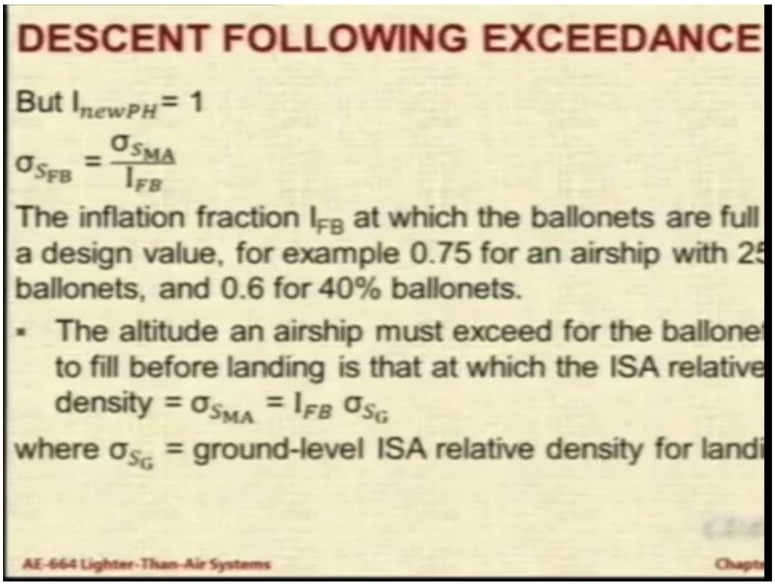


So, one can show that this can lead to a very critical situation.

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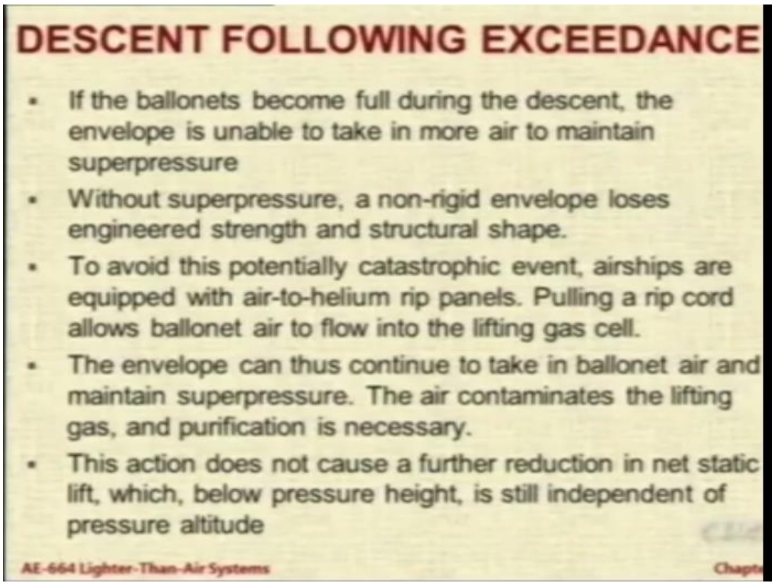


Now if the the ballonet become full during descent, the envelope is unable to take in more air. So, superpressure will be exceeded. Now without superpressure, the envelope will not be able to maintain its shape no, you need superpressure because you want to maintain the shape. When it flies, there is some dynamic pressure. To overcome that the pressure inside should be more than outside.

So, we need superpressure, but now your ballonet is full even before you are reaching the ground. So, the shape of the airship will not remain the shape that it was designed for. So what we will do is to avoid this situation, what you do now is now you have ruptured the ballonet. So, you have an air-to-helium rip panels. So, the pilot will rip the panel. Pulling the rip cord allows the ballonet air to flow in the lifting gas.

So, the ballonet is now tight, it cannot get filled up. If you go further down it is going to create stress in the ballonet. So that will rupture, instead of that we are rupturing intentionally. So now what will happen? Air from the ballonet will go inside the gas chamber. So you are actually corrupting the lifting gas. You are going to reduce the purity of lifting gas.

So, the envelope then continues to take in the ballonet air and maintain superpressure but it contaminates the envelope. So when you come down, you will find that your lifting gas is not now fully pure or as pure as before because some air from ballonet has now been made to go inside. So when you come down after that you will have to purify and remove this air, it is a very costly process and you have to ground airship for some time.

But there is no option available. So the net static lift will not change because that does not depend upon the pressure altitude. The net static lift, you are now below the pressure altitude. So as much as you come down, the ballonet air will be taken in and now the ballonet air going in and going inside the envelope. So, effectively speaking the envelope is now available for the ballonet air to fill. Therefore, the shape will be maintained.