Optical Engineering
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Lecture – 23
Lab 5 – Oslo

Good afternoon. So, we are in our 5th Lab class; I think today's classes are going to be related to what you have been learning.

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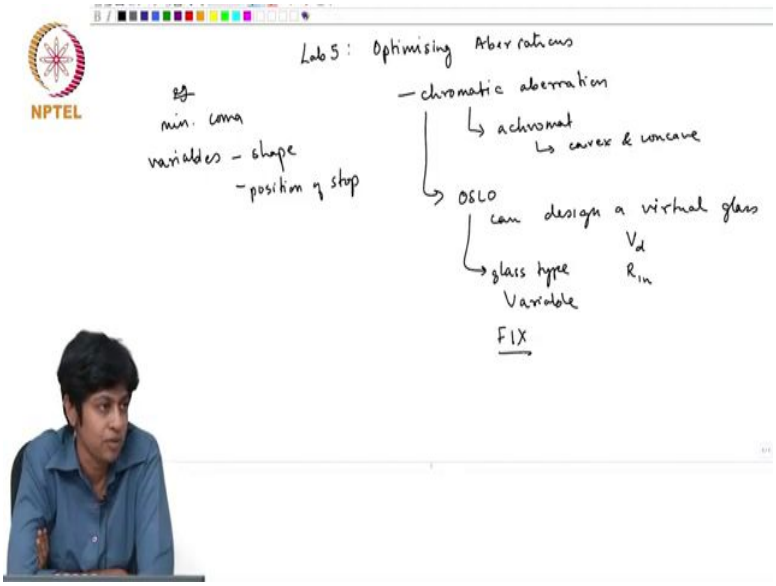

So, it is mostly going to be on so the lab. It is going to be on Optimizing Aberrations. So, you have several exercises that you need to carry out. The first few exercises relate to chromatic aberration. And in the lab class, I am going to ask you to work on an exercise which is slightly different from what we have talked about in the previous classes. So, in the classes, we looked at how you could design an achromat using convex and a concave lens.

So, the optimization was carried out using two different lens types. Now, we are, of course, still going to do that. We are going to take a convex and a concave lens, but one of the exercises that you are given for this afternoon session is how to optimize the glass type. So, I just said you will take two different glasses; one will be a load dispersive glass, one will be a higher dispersive glass and then, you work out what are the focal lengths required for these

two. But also, we will give you the opportunity to optimize the glass type itself. So, what does that mean? You will set up your optical system such that you virtually design a virtual glass ok.

So, OSLO has the ability to ok. What do I mean by a virtual glass? Now, you should know that when I say a different type of glass, I am really talking about the V number of that glass and the V number itself is a function of different refractive indices. So, a virtual glass means I am not going to a catalog and picking out a glass type that readily exists. It will allow me to design and say if I had a glass with these characteristics with these parameters, then I would have minimum chromatic aberration for this system.

Now, it is useful because once you have designed your virtual glass, it then allows you there is a command which will then allow you to go and pick the actual glass which is closest to this virtual glass ok. So, you will carry out aberrations and a detailed set of instructions on how you go about doing this. The idea is not different from what you have done earlier. Earlier, if you are optimizing any parameter you picked the operand. So, say you were minimizing. So, for example, if you were minimizing coma right, you might pick as variables the shape. So, the radius of curvature might have been a variable, so the position of the stop might have been ok.

Now, we are saying can I design a virtual glass? So, actually my glass type is going to be a variable ok. So, the set of instructions will tell you how to set a glass type as a variable, how to run the optimization and once you have optimized. And found out which is the best glass that would give you the minimum chromatic aberration for your set of convex and concave lenses, then you will run use a command called FIX which will automatically pick from you have to tell you OSLO which catalog, which glass catalog to look at and then, it will pick the glass type which is closest to that and then you can check out the aberrations that you have with the actual real glass ok.

So, that is one exercise that I want you to do. It comes in a separate sheet and then, you have another sheet which asks you to design a lens of a certain focal length. Now, you should be able to do this really easily. But unlike last time, where you just plotter the aberrations that

you got for different lens shapes, you are going to repeat that exercise; but you are now going to make sure that the stop is moved to the natural stop position each time ok.

So, these are basically the exercises for this afternoon class. Make sure you re do them, always referring back to the theory that we have covered over the last few weeks; because then, it strengthens your understanding of aberrations and how to correct ok.