Elementary Stereology for Quantitative Microscopy Prof. Sandeep Sangal Department of materials Science and Engineering Indian Institute of Technology, Kanpur Prof. S. Sankaran Department of Metallurgical and materials Engineering Indian Institute of Technology, Madras

> Lecture – 03 Volume Fraction and Particle Size

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I mean what we started yesterday so, what I was seeing in the excel sheet this is a point count which I collected from all of you. So, if you look at this number I have about 42 counts right from each one of you I will write it on the blackboard for the clarity.

But the sake of audience who is sitting here you can just look at this I we have also collected the intersection from each one of you and the average point count is about 5.94 and then average P P is 0.17 and the average intersection is 18.99 and then the average P L per micrometer is 0.01 and then average D in micrometer is about 79.67 ok.

Before I sum up these results and then relate with this microstructure what I will do now that how you use this micron marker to analyze this microstructure ok. So, they micron marker which is shown here is about 200 micron this length. So, and then if you measure it with the scale this is about 17 mm and then and if you also measure the gridlines this is about 51mm. So, let us write all those things on the blackboard.

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So, this is magnification marker it is about 17 mm the length of the gridline is about 51 mm. So, that 17 mm what we have measured with our scale is equivalent to 200 micrometer. So, we have 51 mm so, that is approximately you can calculate by 17 into 51 is equal to 600 micrometer. So, you have in the grids we have about 6 lines which we have used if you count this 1 2 3 4 5 6. So, total length 6 lines is 6 into 600 which is about so, total length is 3600 micrometer.

So, what we can do is so, this measurements what we have done yesterday from the whole class I will show the data. So, this is suppose there are two ways to do it; either you take the sum of the whole point count and then divided by the number of events you measure or you can individually calculate the P P for each event and then finally, take an average both will give the same number and then what I will do is, I will first if you sum up all this you will get this the sum of point count point count is about 249.5.

So, the average point count is this is we have about 42 event. So, this is divided by the 42 you will get about 5.94 so, this is average point count and then you will get the average P P.

So, probably we can which is equal to you see that 0.17 and similarly we can look at this for calculating the P L the total number of intersections sum of which is equal to 797.50 and then you have the average P L in micrometer is what we have calculated is 0.01 and then if you want to calculate the diameter average diameter like what we have shown in

the yesterdays lecture the formula which is that also we have done using this is about 79.67.

So, you can relate this number 79.67 I will also right some few expressions which will relate this diameter with the mean intercept length and some other relations stereological relation also I will show, but what you can, I mean learn from this number is now you look at this image and look at this micron marker is about 200 micron. The average size of this whether it falls within this range that is we have to just look at it presumably and if you do it I think it falls good right it is about 80 micron.

So, you can also look at the, the mean intercept length through this data we have P P this is by P L so, we have P P and P L so, this and this. So, you can calculate the mean intercept length using this and we can also we have seen that already this is average D which is related to 4 by pi times the this is also another relation which is very powerful we can simply calculate this.

So, we can also do something called see when we if you remember yesterday when you measured the boundary length right with the intercept we measured we can also derive some other parameter called boundary length per unit area which is equal to pi by 2 into P L this is also possible.

So; that means, the diameter that each one of this boundary length per given unit area that is also possible from this relation. So, we can check with all those I think later we will compare this results with the probably image j maybe the later stage and I think we will stop this analysis at this stage and we will continue with the next topic and then we will use the data again ok.

So, I will leave it to Professor Sandeep to continue and I will come back again.