COATEST 7L

Application Note #7

Measurement of curved mirrors

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This short note deals with the sensitivity of reflectivity measurements to the curvature of the measured mirror.

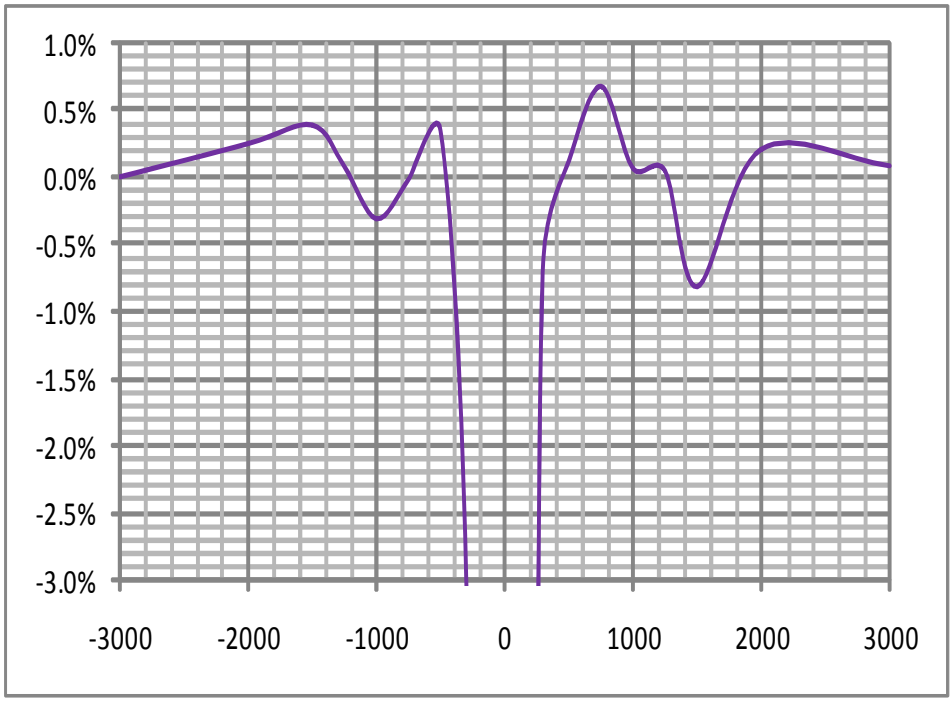
We have shown in Note 5b and in previous papers that it is important to reduce the acceptance angle of the apparatus in order to measure the true specular reflectivity and reject as much as possible the scattered light close to the specular beam.

By doing this, one must insure that the normal to the measured mirror is well co-aligned with the optical axis of the reflectometer; this is provides by the three point definition of the measuring plane. These are factory adjusted in order to realize a perfect alignment. This is the main reason for abandoning the idea of having a scatterometer in the same apparatus. Both instrument require the same accurate alignment and one cannot align three axis (sample normal, scatterometer and reflectometer) and one depth with a three point adjustment.

Another question arises when reducing the acceptance angle: the power of the sample will change the focus of the test beam and the dimension of the beam inside the field acceptance stop. The purpose of this paper is to provide quantitative data about this problem.

We have traced through the system varying the curvature of the sample between zero curvature (plane surface) and +/- 4e-3 mm^{-1} corresponding to a radius of +/- 250 mm.
Negative values correspond to convex mirrors.

The results are shown in the following graph.



The plotted error is the difference between the value measured on a flat sample with 100% reflectivity and the same sample with a radius of curvature indicated by the X-axis.

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One can see that the error is less than 0.5% for R<-500 (CX) and R>300 (CC). Moreover, this is a systematic deviation, and the graph can safely be utilized for applying a correction to the measurements if needed.

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