AEP 711 Problem Set Reflectivity - Detlef Smilgies

General remark: I found that the experimental data cannot be fitted perfectly, partly because of some experimental problems (slits were too wide for good data at small angles) and maybe there was also some inhomogeneity in the sample - as the incident angle is increased, the footprint of the beam on the sample gets smaller and thus a smaller part of the sample is probed.

Hence the goal was to get the trends right. Essentially you should have determined that the thickness of the Cr layer was 10-20% larger than obtained by the thickness monitor, whereas the Pd thickness was correct to within 1%. I appreciated, when you discussed in your solution how the Pd thickness and the Cr thickness affect the main oscillation period and the period of the amplitude modulation of the former.

Additionally the root-mean-square roughness can be determined to be around 4Å, which is quite good, however, somewhat below what one would like for an x-ray mirror or a multilayer substrate (2Å) .

I am attaching my solution and the one by Dave Nowak and Alex Mayer as examples.