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Surface profile investigations by means of acousto-optic technique

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Acousto-optic tunable filters (AOTF) represent a very strong tool in different kinds of investigations where high rate light wavelength variations are required. The rough surfaces profile investigation is among the problems which can be solved partially by this way. Our investigations have been connected with use of AOTF and lens components with strong chromatic aberration. One of the problems was to choose the z-distance resolving power criterion. The proposed criterion is defined by the admissible probability to miss information unit regarding the object characterization in z-distance. In our experiments we used the specially elaborated AOTF based on tellurium dioxide crystal with transmission bandwidth of several nm, depending on the central wavelength position. Also we have used the lenses fabricated with tellurium dioxide because this material provides high chromatic aberrations. The results of experiments are discussed from the point of view of the AOTF possibilities to increase the z-distance resolving power in comparison with existing systems. The 90%-probability distinguishing of defocusing while electric frequency variation of 200 kHz, can be considered as serious advantage. The device improvement can be attained by means of the noise level decreasing to the level taking place for electric frequency of 94 MHz.