Step Height Calibration Using Hamming Window: Band-Pass Filter

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Abstract : Calibration of step heights with high accuracy is needed for many applications in the industry. In general, step height consists of three bands: pass band, transition band (roll-off), and stop band. Abdelsalam used a convolution of the transfer functions of both Chebyshev type 2 and elliptic filters with WFF of the Fresnel transform in the frequency domain for producing a steeper roll-off with the removal of ripples in the pass band- and stop-bands. In this paper, we used a new method based on the Hamming window: band-pass filter for calibration of step heights in terms of perfect adjustment of pass-band, roll-off, and stop-band. The method is applied to calibrate a nominal step height of 40 cm. The step height is measured first by asynchronous dual-wavelength phase-shift interferometry. The measured step height is then calibrated by the simulation of the Hamming window: band-pass filter. The spectrum of the simulated band-pass filter is simulated at $N = 881$ and $f_0 = 0.24$. We can conclude that the proposed method can calibrate any step height by adjusting only two factors which are N and f_0.

Keywords : optical metrology, step heights, hamming window, band-pass filter
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