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Design study of a cross-dispersed spatial heterodyne spectrometer: erratum

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Abstract: We present an erratum to our article [Opt. Express **30**(7), 10547 (2022)].

Erratum

There were some errors that occurred while we writing Eq. (16) and incorrect data in our original article [1], which were due to the author forgetting to revise the wrong equation and data in the paper after simulating and drawing conclusions with the correct equation. An incorrect equation, specifically Eq. (16), was given to calculate the center ray position in the y-axis direction on the detector was presented. The corrected equation is:

$$y(\sigma) = y_{CL}(\sigma) - (f+z)\tan\varphi_1 = \left[f + z - \frac{z}{f}(l_1+l_2)\right]\tan\varphi_{in}(\sigma) \tag{1}$$

Accordingly, we also correct the inequality in Eq. (37) by substituting Eq. (16) into Eq. (18):

$$\begin{cases} l_1 \le \dfrac{2H_G\sin(\alpha_1-\alpha_2)\cos\varphi_{in}(\sigma_{\min,\max}) - h_L\cos(\alpha_1-\varphi_{in}(\sigma_{\min,\max}))}{2\left|\tan\varphi_{in}(\sigma_{\min,\max})\right|} \\ l_1 + l_2 \le \dfrac{2H_{CL}\sin(\alpha_1-\alpha_2)\cos\varphi_{in}(\sigma_{\min,\max}) - h_L\cos(\alpha_1-\varphi_{in}(\sigma_{\min,\max}))}{2\left|\tan\varphi_{in}(\sigma_{\min,\max})\right|} \\ \dfrac{z}{f} \ge \dfrac{\sin(\alpha_1-\alpha_2)}{\cos\alpha_1 - \sin\alpha_1\tan\varphi_{in}(\sigma_{\min})}\dfrac{na}{h_L} \\ \boldsymbol{f + z - \frac{z}{f}(l_1+l_2) \le \dfrac{Na}{\left|\tan\varphi_{in}(\sigma_{\max}) - \tan\varphi_{in}(\sigma_{\min})\right|}} \\ l_2 + f + z \le \dfrac{\dfrac{\cos\left(\theta - \left(2\frac{\sigma_{\min,\max}-\sigma_L}{\sigma_{\min,\max}} + {\varphi_{in}}^2(\sigma_{\min,\max})\right)\tan\theta\right)}{\cos\theta} - \frac{Ma}{2m}}{\left|\tan\left(\left(2\frac{\sigma_{\min,\max}-\sigma_L}{\sigma_{\min,\max}} + {\varphi_{in}}^2(\sigma_{\min,\max})\right)\tan\theta\right)\right|} \end{cases} \tag{2}$$

Additionally, the spacing parameters among the optical elements in Table 2 are corrected as:

Table 2. Key Parameters of the Components Used in the Theoretical Design of the CDSHS

l_1	l_2	f	z	h_L	w_L	w
177 mm	**183 mm**	**130 mm**	**3 mm**	14.91 mm	14.91 mm	14.93 mm
α_1	α_2	$1/d_0$	σ_0	$1/d$	σ_L	θ
70.073°	20°	450 mm^{-1}	15084.9 cm^{-1}	150 mm^{-1}	16129.0 cm^{-1}	2.6625°
M	N	m	n	a		
1024	1024	2	10	0.013 mm		

The correct data of the center ray position $y(\sigma)$ and the height of the interferograms $h(\sigma)$ in Table 3 are slightly different from those in the original article. The corrected data in Table 3 is:

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Table 3. Parameters of Selected Interferograms on the Detector in the Theoretical Design

Interferogram	Wavelength	Wavenumber	$y(\sigma)$	$h(\sigma)$	Y-axis coordinate range
1	620 nm	16129.0 cm^{-1}	**6.5946 mm**	**0.17505 mm**	**6.6500 - 6.5071 mm**
140	640 nm	15625.0 cm^{-1}	**3.6287 mm**	**0.16502 mm**	**3.7112 - 3.5462 mm**
272	660 nm	15151.5 cm^{-1}	0.4775 mm	**0.15437 mm**	**0.5547 - 0.4003 mm**
396	680 nm	14705.9 cm^{-1}	**-2.9069 mm**	**0.14294 mm**	**-2.8354 - -2.9784 mm**
512	700 nm	14285.7 cm^{-1}	**-6.5946 mm**	**0.13047 mm**	**-6.5294 - -6.6500 mm**

In the first paragraph below Table 3, the statement should be corrected to:

Figure 6 shows the y-axis coordinates and widths of the interferograms for different wavelengths at the detector plane. As verified using Eq. (21) and Eq. (31), we know that the minimum height of the interferogram $h(\sigma_{\min})$ **0.13047** mm $> 10a = 0.13$ mm, and the minimum width of the interference area of the interferogram $w_A(\sigma_{\min})$ **7.2126** mm $> 1024a/2 = 6.65$ mm."

The authors regret these mistakes. Reassuringly, the graphs and conclusions were based on correct equations and data, so they remain correct.

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References

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