2dF scale for Hector

Peter Gillingham 26th Aug 2020

with correction to figure 1

The note : 2dF distortion_extended.pdf, dated 22nd June, shows that 2dF distortion is well fitted by the polynomial: $7A \times \boldsymbol{\alpha}^7 + 5A \times \boldsymbol{\alpha}^5 + 3A \times \boldsymbol{\alpha}^3 + 1A \times \boldsymbol{\alpha}$ mm where $\boldsymbol{\alpha}$ is field angle (degrees) and the values 7A through 1A depend on wavelength. These distortion values are to be added to the radius given by flength x tan α, where flength is the focal length, 13760.7 mm, calculated for the corrector temperature 20°C. For 10°C, flength would be 13759.5 mm.

Figure 1 shows a calculation of the image radius using the polynomial coefficients derived for four wavelengths combined and for 10°C. It plots the variation over the field radius of the average scale in arcsec/mm and indicates that this curve is well approximated by a 3rd order polynomial.

Figure 2 (from 2dF distortion_prism_effects.pdf, 29th June) shows the radial adjustments that have to be made in the four zones in which prisms will be mounted with different tilts.

2dF distortion for all wavelengths and 10 deg C (fflength = 13759.5)

					poly coeff	
				A7	0.27140	
	fflength	13760		A5	0.83480	
				A3	6.17390	
field	radius			A1	-7.28010	
radius	without					
α	distortion	distortion	total	average	average α	average
deg	mm	mm	mm	mm/deg	deg	arcsec/mm
0.0	0.000	0.000	0.000			
0.1	24.015	-0.722	23.293	232.93	**0.05**	**15.455**
0.2	48.030	-1.406	46.624	233.12	**0.15**	**15.443**
0.3	72.045	-2.015	70.030	233.43	**0.25**	**15.422**
0.4	96.061	-2.508	93.553	233.88	**0.35**	**15.392**
0.5	120.077	-2.840	117.237	234.47	**0.45**	**15.353**
0.6	144.094	-2.962	141.132	235.22	**0.55**	**15.305**
0.7	168.112	-2.816	165.297	236.14	**0.65**	**15.245**
0.8	192.131	-2.333	189.799	237.25	**0.75**	**15.174**
0.9	216.151	-1.429	214.723	238.58	**0.85**	**15.089**
1.0	240.173	0.000	240.173	240.17	**0.95**	**14.989**

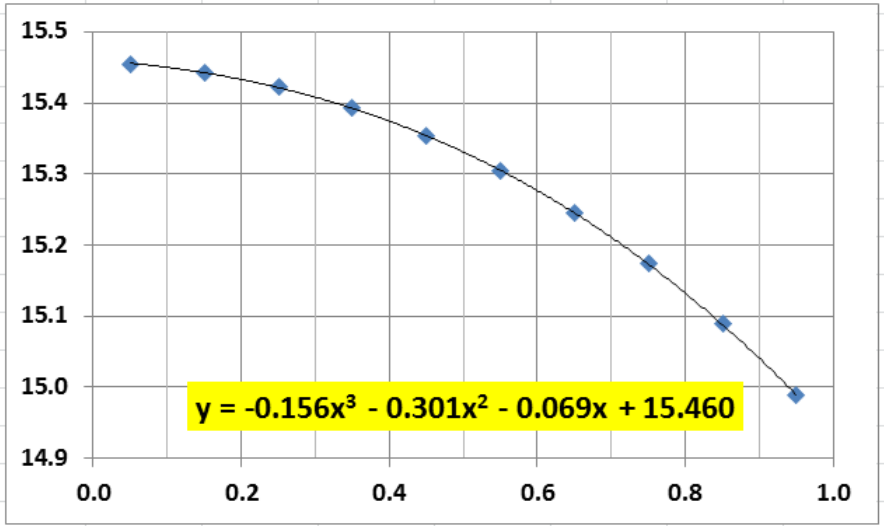

Figure 1. Calculation of image radius on 2dF focal plane allowing for focal length calculated at 10°C and for distortion with combined wavelengths 370, 430, 530, and 780 nm. Plot is for average scale (arcsec/mm) v field radius (degrees).

Figure 2: Plot of amounts by which the prism centres must be placed radially outward from the 2dF positions for the same angular field.