POSTER

ABSTRACT

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Systematic Trends in Sloan Digital Sky Survey Photometric data

We investigate the Sloan Digital Sky Survey (SDSS) photometry from Data Release 8 (DR8) in the search for systematic trends that still exist after the calibration effort of Padmanabhan et al. We consider both the aperture and point-spread function (PSF) magnitudes in DR8. Using the objects with repeat observations, we find that a large proportion of the aperture magnitudes suffer a ~0.2-2% systematic trend as a function of PSF full-width half-maximum (FWHM), the amplitude of which increases for fainter objects. Analysis of the PSF magnitudes reveals more complicated systematic trends of similar amplitude as a function of PSF FWHM and object brightness. We suspect that sky over-subtraction is the cause of the largest amplitude trends as a function of PSF FWHM. We also detect systematic trends as a function of subpixel coordinates for the PSF magnitudes with peak-to-peak amplitudes of ~1.6 mmag and ~4-7 mmag for the over- and under-sampled images, respectively. We note that the systematic trends are similar in amplitude to the reported ~1% and ~2% precision of the SDSS photometry in the *griz* and *u* wavebands, respectively, and therefore their correction has the potential to substantially improve the SDSS photometric precision. We provide an IDL program specifically for this purpose. Finally, we note that the SDSS aperture and PSF magnitude scales are related by a non-linear transformation that departs from linearity by ~1-4%, which, without correction, invalidates the application of a photometric calibration model derived from the aperture magnitudes to the PSF magnitudes, as has been done for SDSS DR8.