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MICRO-PIXEL METROLOGY FOR PRECISION ASTROMETRY DETECTION ON NEARBY
TERRESTRIAL PLANETS

Abstract

High-precision astrometry technique is ideal for the terrestrial exoplanets detection. However it is necessary to go to space to reach the precision required to detect all planets down to the telluric regime. We developed the micro-Pixel Centroiding technique and the metrology on the focal plane aiming the micro-arcsecond space astrometry. The focal plane CCD introduces errors related to the pixels, which are of several types. Each pixel integrates the signal over a surface, and if the centroid is not at least Nyquist sampled, it will introduce sampling errors. Moreover, inter pixel variations also introduce some errors, even when the centroids are properly sampled: pixels have different dark currents, sensitivities, they are not regularly spaced and the quantum efficiency (QE) profile within each pixel is not uniform. While the dark current and the sensitivity variations are usually calibrated with darks and flat fields, at our level or precision we have to take into account all the parameters. This is the role of the interferometric metrology system located on the spacecraft, with has fibers positioned on the mirror edge and pointed towards the detector.