
CAMERA INFORMATION

- Camera ID: DAC 101
- Ixpress 132C
- Rollei Lens Control S
- Pixel size: 0.009 mm
- Image size: 5440 x 4080 pixels

DATASETS

- Set1: May, 2009
- Set2: May, 2009

Calibration Date: Set 1_PointOnly

Square Root of A Posteriori Reference Variance: $\sigma_0 = 1.43\text{e-}003\text{mm}$

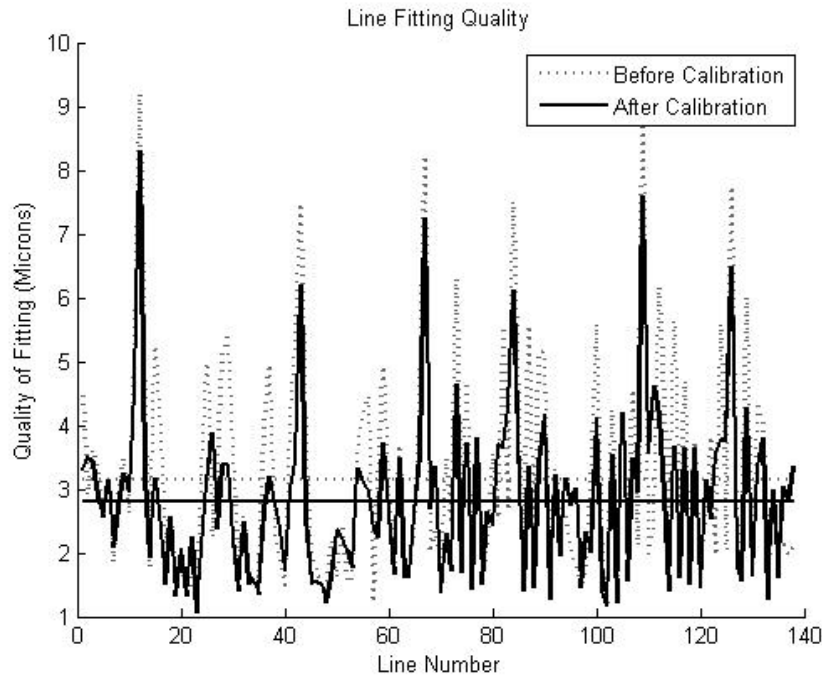
σ_0 is smaller than half the pixel size (0.0045mm), so no blunders are present and the utilized distortion model is appropriate. Therefore, the bundle adjustment results are acceptable.

Interior Orientation Parameters:

x_p (mm)	0.1477	σ_{x_p} (mm)	0.0065
y_p (mm)	0.1109	σ_{y_p} (mm)	0.0065
c (mm)	60.3697	σ_c (mm)	0.0153
k_1 (mm ⁻¹)	-2.1148e-006	σ_{k_1} (mm ⁻¹)	2.5918e-007

The standard deviations of the estimated IOPs are all in the range of a few microns, so these results are acceptable.

Plotting Sigma after Line fitting:



Mean Sigma Before Calibration(μm)	3.1465
Mean Sigma After Calibration(μm)	2.8090

The average sigma value after calibration is lower than the average value before calibration and all sigma values are less than a pixel in size, so the calibration has been a success.

RMS using 30 points:

X(m)	0.00019
Y(m)	0.00034
Z(m)	0.00018

They are all much less than a millimeter in size, so the RMS values indicate that the ground coordinate estimation in the bundle adjustment has been successful.

Calibration Date: Set1_Linear

Square Root of A Posteriori Reference Variance: $\sigma_0 = 3.03\text{e-}003\text{mm}$

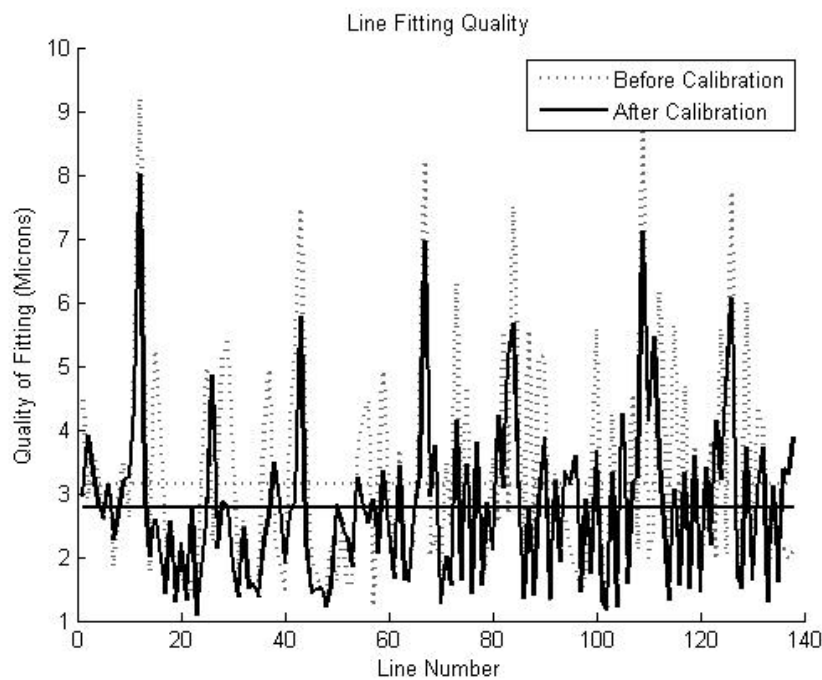
σ_0 is smaller than half the pixel size (0.0045mm), so no blunders are present and the utilized distortion model is appropriate. Therefore, the bundle adjustment results are acceptable.

Interior Orientation Parameters:

x_p (mm)	0.1608	σ_{x_p} (mm)	0.0034
y_p (mm)	0.1189	σ_{y_p} (mm)	0.0034
c (mm)	60.3846	σ_c (mm)	0.0074
k_1 (mm ⁻¹)	-2.7969e-006	σ_{k_1} (mm ⁻¹)	4.2917e-008

The standard deviations of the estimated IOPs are all in the range of a few microns, so these results are acceptable.

Plotting Sigma after Line fitting:



Mean Sigma Before Calibration(μm)	3.1465
Mean Sigma After Calibration(μm)	2.7673

The average sigma value after calibration is lower than the average value before calibration and all sigma values are less than a pixel in size, so the calibration has been a success.

RMS using 30 points:

X(m)	0.00030
Y(m)	0.00034
Z(m)	0.00026

They are all much less than a millimeter in size, so the RMS values indicate that the ground coordinate estimation in the bundle adjustment has been successful.

Calibration Date: Set2_PointOnly

Square Root of A Posteriori Reference Variance: $\sigma_0 = 1.53e-003$ mm

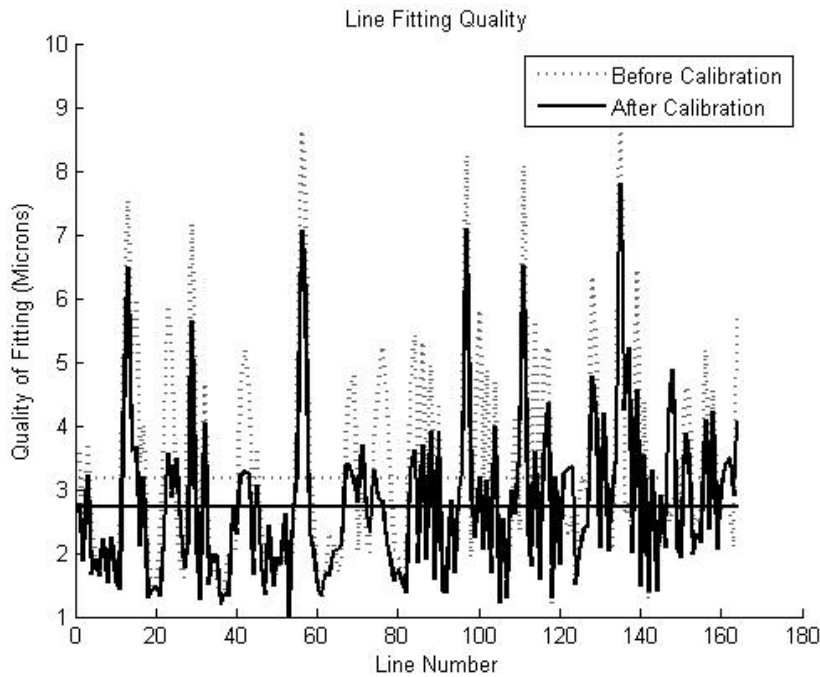
σ_0 is smaller than half the pixel size (0.0045mm), so no blunders are present and the utilized distortion model is appropriate. Therefore, the bundle adjustment results are acceptable.

Interior Orientation Parameters:

x_p (mm)	0.1411	σ_{x_p} (mm)	0.0055
y_p (mm)	0.1130	σ_{y_p} (mm)	0.0054
c (mm)	60.3861	σ_c (mm)	0.0168
k_1 (mm ⁻¹)	-1.8932e-006	σ_{k_1} (mm ⁻¹)	2.0326e-007

The standard deviations of the estimated IOPs are all in the range of a few microns, so these results are acceptable.

Plotting Sigma after Line fitting:



Mean Sigma Before Calibration(μm)	3.1706
Mean Sigma After Calibration(μm)	2.7316

The average sigma value after calibration is lower than the average value before calibration and all sigma values are less than a pixel in size, so the calibration has been a success.

RMS using 30 points:

X(m)	0.00016
Y(m)	0.00025
Z(m)	0.00020

They are all much less than a millimeter in size, so the RMS values indicate that the ground coordinate estimation in the bundle adjustment has been successful.

Calibration Date: Set2_Linear

Square Root of A Posteriori Reference Variance: $\sigma_0 = 2.99\text{e-}003$ mm

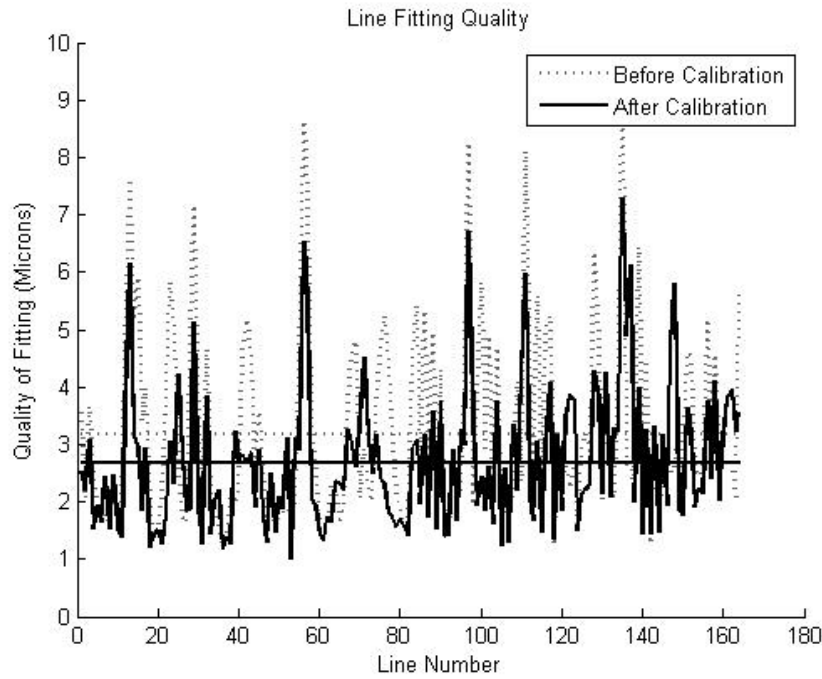
σ_0 is smaller than half the pixel size (0.0045mm), so no blunders are present and the utilized distortion model is appropriate. Therefore, the bundle adjustment results are acceptable.

Interior Orientation Parameters:

x_p (mm)	0.1513	σ_{x_p} (mm)	0.0025
y_p (mm)	0.1037	σ_{y_p} (mm)	0.0024
c (mm)	60.4075	σ_c (mm)	0.0071
k_1 (mm^{-1})	-2.5192e-006	σ_{k_1} (mm^{-1})	3.2771e-008

The standard deviations of the estimated IOPs are all in the range of a few microns, so these results are acceptable.

Plotting Sigma after Line fitting:



Mean Sigma Before Calibration(μm)	3.1706
Mean Sigma After Calibration(μm)	2.6814

The average sigma value after calibration is lower than the average value before calibration and all sigma values are less than a pixel in size, so the calibration has been a success.

RMS using 30 points:

X(m)	0.00023
Y(m)	0.00025
Z(m)	0.00026

They are all much less than a millimeter in size, so the RMS values indicate that the ground coordinate estimation in the bundle adjustment has been successful.

CAMERA STABILITY ANALYSIS FOR DAC 101

Dataset	RMSE _{offset} (mm)
Set1_Pointonly VS Set1_Linear	0.0013
Set2_Pointonly VS Set2_Linear	0.0018
Set1_Pointonly VS Set2_Pointonly	0.0040
Set1_Linear VS Set2_Linear	0.0055
Feb08-2006 VS Feb09-2006	0.0022
Feb08-2006 VS Set1_Linear	0.0085
Feb08-2006 VS Set2_Linear	0.0034
Feb09-2006 VS Set1_Linear	0.0065
Feb09-2006 VS Set2_Linear	0.0022

Analysis:

Pixel size = 0.009mm

For each pair of datasets, the square root of the variance component is less than a pixel in size. Therefore, all the above pairs of datasets are considered to be stable with respect to one another, which indicates that the camera is stable for these datasets.