

Computed Result

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Features selection

Conics

C1 =

0.0000	0.0000	-0.0003
0.0000	0.0000	-0.0001
-0.0003	-0.0001	1.0000

C2 =

0.0000	0.0000	-0.0004
0.0000	0.0000	-0.0002
-0.0004	-0.0002	1.0000

Symmetrc points

```
symPoints =  
  
      257      816  
    1252    1022  
      766      441  
    1033      465  
      324    1287  
      709    1415  
      374      722  
    1323      892
```

Wheels’ plane rectification

Circular points

```
I =  
  
1.0e+03 *  
  
3.7067 - 1.1638i  
2.1351 + 3.7699i  
0.0010 + 0.0000i
```

```
J =  
  
1.0e+03 *  
  
3.7067 + 1.1638i  
2.1351 - 3.7699i  
0.0010 + 0.0000i
```

Transformation Matrix

```
Hr =  
  
-0.0002  -0.0001  -0.0000  
 0.0001  -0.0002   0.0000  
-0.0002  -0.0001   1.0000
```

Ratio between the diameter and wheel-to-wheel distance

```
result =  
  
0.2166
```

Camera Calibration

Vanishing Points

$$\begin{aligned} v_h = & \\ & 1.0e+03 * \\ & \begin{bmatrix} 4.3374 \\ 0.0922 \\ 0.0010 \end{bmatrix} \end{aligned}$$

$$\begin{aligned} v_v = & \\ & 1.0e+03 * \\ & \begin{bmatrix} 1.5590 \\ 9.0920 \\ 0.0010 \end{bmatrix} \end{aligned}$$

$$\begin{aligned} v_l = & \\ & 1.0e+03 * \\ & \begin{bmatrix} -3.4057 \\ 0.0522 \\ 0.0010 \end{bmatrix} \end{aligned}$$

$$\begin{aligned} v_1 = & \\ & 1.0e+04 * \\ & \begin{bmatrix} 1.1146 \\ 1.1083 \\ 0.0001 \end{bmatrix} \end{aligned}$$

$$\begin{aligned} v_2 = & \\ & 1.0e+03 * \\ & \begin{bmatrix} 3.3255 \\ -1.5413 \\ 0.0010 \end{bmatrix} \end{aligned}$$

Calibration Matrix

$$\begin{aligned} K = & \\ & 1.0e+03 * \\ & \begin{bmatrix} 3.3355 & 0 & 1.5929 \\ 0 & 3.5217 & 1.7725 \\ 0 & 0 & 0.0010 \end{bmatrix} \end{aligned}$$

Image of absolute Conic

iac =

0.0000	-0.0000	-0.0001
-0.0000	0.0000	-0.0001
-0.0001	-0.0001	1.0000

3D points reconstruction

3D points

worldPoints =

-0.0049	0.0049	-0.0012	0.0012	-0.0021	0.0021	-0.0045	0.0045
0.0048	0.0048	0.0100	0.0100	0	0	0.0071	0.0071
0.0048	0.0048	0.0092	0.0092	0	0	0.0056	0.0056
1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Camera Pose Estimation

These results is reported for completeness, even if I know that they can not be acceptable, since the rotation matrix inside Mcam_to world is not orthogonal.

Transformation matrix from the camera frame to the car frame

Mcam_to_car =

30.7591	16.9482	-5.7640	10.3985
5.8781	-3.2032	-24.1700	4.9773
0.0000	0.0000	-0.0000	-4.6423
0	0	0	1.0000

Camera location

camera =

10.3985
4.9773
-4.6423
1.0000