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                                four_par_displ.txt
% four_par.m 1-oct-07
% compute 4-parameter transformation for inner
% orientation and apply it to measured points

% x = a*X + b*Y + c
% y = -b*X + a*Y + d
%
% [ x ] = [ a  b ] [ X ] + [ c ]
% [ y ]   [-b  a ] [ Y ]   [ d ]
%
% x + vx - a*X - b*Y - c = 0
% y + vy + b*X - a*Y - d = 0
%
% vx - a*X - b*Y - c = -x
% vy + b*X - a*Y - d = -y
%
% vx + [ -X  -Y  -1  0 ] [ a ] = [ -x ]
% vy + [ -Y   X   0 -1 ] [ b ]   [ -y ]
%                               [ c ]
%                               [ d ]

% fiducial coordinates (point #'s from calib. report)
% 2. 110.006 109.984
% 1. -109.990 -110.012
% 4. 110.003 -110.012
% 3. -109.994 109.984

% fiducial coordinates
calx=[ 110.006; -109.990; 110.003; -109.994];
caly=[ 109.984; -110.012; -110.012; 109.984];

% observed pixel coordinates: line & sample
obs1=[ 7473; 145; 141; 7478];
obs2=[ 206; 7545; 212; 7540];

f=[-obs1(1); -obs2(1); -obs1(2); -obs2(2); -obs1(3); -obs2(3); -obs1(4); -obs2(4)];
B=[-calx(1) -caly(1) -1 0;
   -caly(1) calx(1) 0 -1;
   -calx(2) -caly(2) -1 -0;
   -caly(2) calx(2) 0 -1;
   -calx(3) -caly(3) -1 0;
   -caly(3) calx(3) 0 -1;
   -calx(4) -caly(4) -1 0;
   -caly(4) calx(4) 0 -1];
disp('4-parameter results');
p=inv(B'*B)*B'*f
resid=f - B*p
a=p(1);
b=p(2);
c=p(3);
d=p(4);

% invert and apply to measurements (l,s) -> (x,y)
% shift pixel observations to center

ph12=[1176.5; 1994.0];
s311=[2807.5; 3855.0];
t19 = [3847.5; 3834.5];
ph11=[7046.5; 687.5];
ph21=[6902.0; 6240.0];

Minv=inv([a b; -b a]);
shift=[c;d];

ph12_f=Minv*(ph12 - shift)
s311_f=Minv*(s311 - shift)
t19_f =Minv*(t19 - shift)
ph11_f=Minv*(ph11 - shift)
ph21_f=Minv*(ph21 - shift)

%=====
%=====

% output listing
% created by "diary filename", diary off

four_par
4-parameter results
p =
    -0.0227655513986775
     33.3323863353989
    3809.71679569339
    3875.95800869688

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```
resid =  
  0.241627158738993  
  0.691671079954176  
  0.258293161828988  
 -0.308334432129413  
 -0.749968787020407  
 -0.20000151553586  
  0.250048466447879  
 -0.183335132291177  
ph12_f =  
  56.5142729683378  
 -78.9601497661831  
s311_f =  
  0.649293404000044  
 -30.0669146243122  
t19_f =  
  1.24300083275147  
  1.13437728476704  
ph11_f =  
  95.5900910577259  
  97.1715416006091  
ph21_f =  
 -70.9866029309643  
  92.7226488991785  
diary off
```