(b). Computing the Intrinsic and Extrinsic parameters

```
V = [];
for i = 1:4
    H = eval(['H' num2str(i)]);

    h1 = H(:,1);
    h2 = H(:,2);
    h3 = H(:,3);

    v11 = [h1(1)*h1(1), h1(1)*h1(2)+h1(2)*h1(1), h1(2)*h1(2), h1(3)*h1(1)+h1(1)*h1(3),
    v12 = [h1(1)*h2(1), h1(1)*h2(2)+h1(2)*h2(1), h1(2)*h2(2), h1(3)*h2(1)+h1(1)*h2(3),
    v22 = [h2(1)*h2(1), h2(1)*h2(2)+h2(2)*h2(1), h2(2)*h2(2), h2(3)*h2(1)+h2(1)*h2(3),

    V = [V; v12'; (v11-v22)'];
end

[U, Sigma, V_transpose] = svd(V);

b = V_transpose(:,end);

B11 = b(1);
B12 = b(2);
B22 = b(3);
B13 = b(4);
B23 = b(5);
B33 = b(6);

B = [B11, B12, B13; B12, B22, B23; B13, B23, B33];

disp("Matrix B >>");
```

```
Matrix B >>
```

```
disp(B);
```

```
   -0.0000   -0.0000    0.0005
   -0.0000   -0.0000    0.0004
    0.0005    0.0004   -1.0000
```

```
v0 = (B12*B13 - B11*B23)/(B11*B22 - B12^2);
lambda = B33 - (B13^2 + v0*(B12*B13-B11*B23))/B11;
alpha = sqrt(lambda/B11);
beta = sqrt(lambda*B11/(B11*B22-B12^2));
gamma = -B12*alpha^2*beta/lambda;
u0 = gamma*v0/alpha - B13*alpha^2/lambda;

A = [alpha, gamma, u0; 0, beta, v0; 0, 0, 1];

disp("Intrinsic Parameters matrix >>");
```

Intrinsic Parameters matrix >>

```
disp(A);
```

```
  686.5929   -2.2802  341.2583
         0  671.0162  238.1869
         0         0    1.0000
```

```
files = ["images2", "images9", "images12", "images20"];

for i = 1:4
    H = eval(['H' num2str(i)]);

    h1 = H(:,1);
    h2 = H(:,2);
    h3 = H(:,3);

    lambda_r = 1/ norm(A\h1);
    r1 = lambda_r*(A\h1);
    r2 = lambda_r*(A\h2);
    r3 = cross(r1,r2);
    t  = lambda_r*(A\h3);

    R = [r1, r2, r3];

    disp(["Rotation Matrix for >> " files(i)]);
    disp(R);
    disp(["Translation vector for >> " files(i)]);
    disp(t);

    disp(["Transpose(R)*R for >> " files(i)]);
    disp(R'*R);

    [U, Sigma, V_transpose] = svd(R);
    R_new = U*V_transpose;

    disp(["New rotation matrix for >> " files(i)]);
    disp(R_new);
    disp(["Transpose(R_new)*R_new for >> " files(i)]);
    disp(R_new'*R_new);

end
```

```
    "Rotation Matrix for >> "    "images2"
   -0.9998   -0.0047   -0.0124
   -0.0128    0.9926   -0.1630
    0.0146   -0.1630   -0.9925
    "Translation vector for >> "    "images2"
  157.6667
 -102.6320
 -382.9962
    "Transpose(R)*R for >> "    "images2"
```

```
   1.0000   -0.0104         0
  -0.0104    1.0119         0
        0         0    1.0118
   "New rotation matrix for >> "    "images2"
  -0.2586   -0.8696    0.4207
  -0.5706    0.4889    0.6598
  -0.7794   -0.0694   -0.6226
   "Transpose(R_new)*R_new for >> "    "images2"
   1.0000    0.0000   -0.0000
   0.0000    1.0000   -0.0000
  -0.0000   -0.0000    1.0000
   "Rotation Matrix for >> "    "images9"
   0.9313   -0.0143    0.3636
   0.0179   -0.9948   -0.0937
   0.3638    0.0951   -0.9262
   "Translation vector for >> "    "images9"
-104.9055
  93.1996
 329.4738
   "Transpose(R)*R for >> "    "images9"
   1.0000    0.0035   -0.0000
   0.0035    0.9988   -0.0000
  -0.0000   -0.0000    0.9988
   "New rotation matrix for >> "    "images9"
   0.7700    0.6136    0.1749
  -0.5399    0.7727   -0.3339
  -0.3400    0.1627    0.9262
   "Transpose(R_new)*R_new for >> "    "images9"
   1.0000    0.0000   -0.0000
   0.0000    1.0000   -0.0000
  -0.0000   -0.0000    1.0000
   "Rotation Matrix for >> "    "images12"
  -0.9311    0.0198   -0.3625
   0.0546    0.9898   -0.0875
   0.3607   -0.1016   -0.9227
   "Translation vector for >> "    "images12"
 154.0761
-103.3543
-439.4594
   "Transpose(R)*R for >> "    "images12"
   1.0000   -0.0011         0
  -0.0011    0.9905         0
        0         0    0.9905
   "New rotation matrix for >> "    "images12"
  -0.9620   -0.0832   -0.2600
  -0.0640    0.9946   -0.0814
   0.2653   -0.0616   -0.9622
   "Transpose(R_new)*R_new for >> "    "images12"
   1.0000    0.0000   -0.0000
   0.0000    1.0000   -0.0000
  -0.0000   -0.0000    1.0000
   "Rotation Matrix for >> "    "images20"
   0.9991   -0.0245    0.0174
  -0.0152   -0.7213   -0.6885
   0.0386    0.6882   -0.7211
   "Translation vector for >> "    "images20"
-125.1451
  24.2143
 388.5909
   "Transpose(R)*R for >> "    "images20"
   1.0000    0.0131    0.0000
   0.0131    0.9945    0.0000
   0.0000    0.0000    0.9943
   "New rotation matrix for >> "    "images20"
```

```
 0.5988    0.6535    0.4630
-0.7949    0.5553    0.2444
-0.0973   -0.5144    0.8520
 "Transpose(R_new)*R_new for >> "    "images20"
 1.0000    0.0000    0.0000
 0.0000    1.0000    0.0000
 0.0000    0.0000    1.0000
```