

```
close all; clear all;
warning off
set(0,'DefaultFigureWindowStyle','docked')
workingDir = 'C:\Users\Ludovic\Desktop\bulle\';
mkdir(workingDir)
mkdir(workingDir,'images')

shuttleVideo = VideoReader('bulle.mp4');
bbox = [140 575 40 440];
bx = bbox(2)-bbox(1);
by = bbox(4)-bbox(3);
v = VideoWriter('rayon.mp4', 'MPEG-4');
open(v);
seuil = 5;
first = 1; oldrow = 0; oldcol = 0; rx=[];
rayon = []; d = [];
figure (1)
set(gca, 'FontSize', 30, 'fontName','Times')
while hasFrame(shuttleVideo)
    rt=zeros(bx,2);
    read = 0; dessin = 0;
    img = readFrame(shuttleVideo);
    Img1b = rgb2gray(img);%Convertie l'image en nuance de gris
    Img1 = Img1b(bbox(3):bbox(4), bbox(1):bbox(2));%Découpe l'image
    for k=1:bx
        dessin = 0;
        xr = [];
        for j=1:by
            if Img1(j,k)<=85
                xr = [xr j];
                dessin = 1;
            end
        end
        if dessin == 1
            rt(k,1) = xr(1); rt(k,2) = xr(end);
        end
    end
    [row, col] = find(rt);
    d = [d length(row)/2];
    XCentre = bx/2;
    YCentre = by/2;
    Rayon = d(end)/2;
    VTheta = (0:1:360)*pi / 180;
    XCercle = XCentre + Rayon * cos(VTheta);
    YCercle = YCentre + Rayon * sin(VTheta);
    x = 1:bx;
    subplot(2,2,1)
    hold on
    plot(XCercle, YCercle, '-b', 'LineWidth', 2)
    xlabel('x [px]')
    ylabel('y [px]')
    axis([0 bbox(4)-bbox(3) 0 bbox(2)-bbox(1)])
    axis equal
    grid on
end
```

```
hold off
subplot(2,2,2)
hold on
xlabel('Numéro de l image')
ylabel('Diamètre de la bulle')
plot(1:length(d), d, '-b', 'LineWidth', 2);
grid 'on'
hold off
subplot(2,2,3)
hold on
imshow(Img1)
plot(x, rt(:,1), '.b');
plot(x, rt(:,2), '.b');
title('Zoom sur bulle en nuance de gris')
hold off
subplot(2,2,4)
imshow(img)
title('Film caméra')
first = 0;

f = getframe(gcf);
pause(0.1);
clf;
writeVideo(v,f);
end
close(v);
```