Assignment 3

```
close all; clc; clear all;

STARTING_FRAME = 0;
ENDING_FRAME = 6;

for k = STARTING_FRAME : ENDING_FRAME

    % Gathers image . . .
    Irgb = imread(['impellers/rotor', sprintf('%2.2d', k), '.jpg']);

    % Converts to hsv . . .
    Ihsv = rgb2hsv(Irgb);

    % Uses only brightness component . . .
    I = Ihsv(:, :, 3);

    % Performs edge detection on image . . .
    BW = edge(I, 'canny', [0.1, 0.67]);     % hysteresis, gamma (blur)

    size = 1;
    Istats = FillImage(BW, size);
    while (length(Istats) ~= 1)
        size = size + 1;
        [Istats, BW_fill] = FillImage(BW, size);
    end

    % Calculate radius and center of object
    radius = max(Istats.BoundingBox(3) / 2, Istats.BoundingBox(4) /
 2);
    Center.x = Istats.BoundingBox(1) + Istats.BoundingBox(3) / 2;
    Center.y = Istats.BoundingBox(2) + Istats.BoundingBox(4) / 2;

    % Create a circle inside of matrix . . .
    zeromatrix = zeros(length(BW_fill));
    img_circle = MidpointCircle(zeromatrix, radius, Center.x,
 Center.y, 1);
    img_circle = imfill(img_circle, 'holes');

    % Gathers empty space inside of circle . . .
    empty_space_px = img_circle - BW_fill;

    % Show image with box and circle . . .
%     imshow(BW_fill);
%     rectangle('Position', Istats.BoundingBox, 'EdgeColor', 'r');
%     rectangle('Position', Istats.BoundingBox, 'Curvature', [1, 1],
 'EdgeColor', 'g');

    % Gather number of pixels for ratio . . .
    ratio = sum(empty_space_px(:) ~= 0) / bwarea(img_circle);
    fprintf('Ratio %2.2d: %1.4f\n', k, ratio);
```

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end
```

```
Ratio 00: 0.4345
Ratio 01: 0.1631
Ratio 02: 0.4184
Ratio 03: 0.4649
Ratio 04: 0.2520
Ratio 05: 0.1695
Ratio 06: 0.2777
```

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