

Porosity Model

Step-1

```
# Loading the image
img = cv.imread(f'Sample Image.jpg')
print(img.shape)
```

8562, 8497, 3)

```
# Showing RGB image
rgb = cv.cvtColor(img, cv.COLOR_BGR2RGB)
plt.axis('off')
plt.imshow(rgb)
```

<matplotlib.image.AxesImage at 0x7fae264d3bb0>



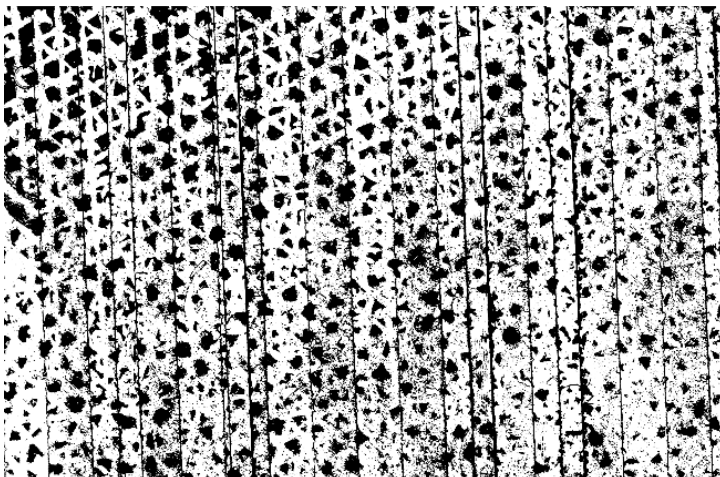
First, loading the image and showing it's RGB image using 'matplotlib' library.

Step-2

```
# Applying blurring for reducing noise
blur = cv.GaussianBlur(img, (13,13), 0)

# Converting the blur image to grayscale image
gray = cv.cvtColor(blur, cv.COLOR_BGR2GRAY)

# binarizing the image
ret, binary_gray = cv.threshold(gray, 74, 255, cv.THRESH_BINARY)
cv2.imshow(binary_gray)
```



Now, applying the Gaussian blur for reducing the noise and converting that image to a grayscale image, and then binarizing the image with a threshold of 74. This value of the threshold can be changed for better accuracy by looking at the binary image.

Step-3

In this step, calculating the number of total pixels covering the object and then calculating the number of pixels covering pores, which are zero grayscale value pixels.

```
# Calculating total number of pixel
total_pixel = img.shape[0] * img.shape[1]

# Only 0 and 255 grayscale pixels in the image where pixel with 0 grayscale value
# Calculating number of pore pixel
pore_pixel = total_pixel - cv.countNonZero(binary_gray)

print(f'Total number of pixel in the image : {total_pixel}')
print(f'Number of pore pixels in the image : {pore_pixel}')
```

```
Total number of pixel in the image : 72751314
Number of pore pixels in the image : 23647572
```

Step-4

Here, calculating the percentage of porosity of metal.

```
# Calculating Porosity percentage
porosity_percentage = (pore_pixel/total_pixel) * 100
print(f'Porosity percentage : {round(porosity_percentage, 2)}%')
```

```
Porosity percentage : 32.5%
```

By Morphological operation

In this method, the morphological closing operation is applied for reducing the noise which performs dilation followed by erosion on a grayscale image.

Now, binarizing the image, inverting it, and doing the same process mentioned above expect that here pore pixels are non-zero pixels. Then calculating the porosity percentage.