# 1 Matlab correction

## 1.1 Cell configuration

The following values are reported:

$$f^{intra} = 50$$
$$e^{intra} = 158$$
$$v^{intra} = 107$$

$$f^{inter} = 4$$
$$e^{inter} = 42$$
$$v^{inter} = 50$$

Then, it is easy to compute the following values:

$$\begin{aligned} A &= f^{intra} = 50 \\ P &= -4f^{intra} + 2e^{intra} = 116 \\ \chi_8 &= v^{intra} - e^{intra} + f^{intra} = -1 \\ \chi_4 &= v^{inter} - e^{inter} + f^{inter} = 12 \end{aligned}$$

## 1.2 Neighborhood configuration

The configuration is computed using the convolution function conv2.

```
F = [1 4; 2 8];
XF = conv2(double(X),F,'same');
h = hist(XF(:),16);
bar(0:15,h);
```

Then, the functionals are computed with the following lines. One should get the same values as previously counted.

```
f_intra = [0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1];
e_intra = [0 2 1 2 1 2 2 2 0 2 1 2 1 2 2 2];
v_intra = [0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1];
EulerNb8 = h*v_intra' - h*e_intra' + h*f_intra'
f_inter = [0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1];
e_inter = [0 0 0 1 0 1 0 2 0 0 0 1 0 1 0 2];
v_inter = [0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1];
EulerNb4 = h*v_inter' - h*e_inter' + h*f_inter'
```

```
Area = h*f_intra'
Perimeter = -4*h*f_intra' + 2*h*e_intra'
```

## 1.3 Crofton perimeter

The Crofton perimeter is computed with the same strategy.

```
Perimeter4 = [0 pi/2 0 0 0 pi/2 0 0 pi/2 pi 0 0 pi/2 pi 0 0];
P4 = h*Perimeter4'
Perimeter8 = [0 pi/4*(1+1/(sqrt(2))) pi/(4*sqrt(2)) pi/(2*sqrt(2)) 0 pi
    ↪ /4*(1+1/(sqrt(2))) 0 pi/(4*sqrt(2)) pi/4 pi/2 pi/(4*sqrt(2)) pi/(4*
    ↪ sqrt(2)) pi/4 pi/2 0 0];
P8 = sumh*Perimeter8'
```

The obtained values are:

```
Command window

P4 =    91.1062
P8 =    77.7640
```