Fuzzy Modelling

LECTURE 4

Free software, runs on:

- Microsoft Windows,
- GNU/Linux,
- macOS,
- BSD

Functions:

- scripts,
- calculations,
- 2D plots,
- 3D plots

https://www.gnu.org/software/octave/#install

Example 4.1.

Script:

```
% Gaussian membership functions

xb=[-15:0.25:15]
yb=exp(-((xb-5)/2).^2)

xc=[-15:0.25:15]
yc=exp(-((xb+8)/4).^2)

% plot , color, parameters, line width,
plot (xb,yb,'c-x','linewidth', 2,
      xc,yc,'r-x','linewidth', 2)

% axis , line width, font size
set(gca,'linewidth',2, 'fontsize',18)
grid on

% text position, name, font size
text(7.3,0.5,'MFB','fontsize', 18)
text(-3.4,0.5,'MFC','fontsize', 18)
```

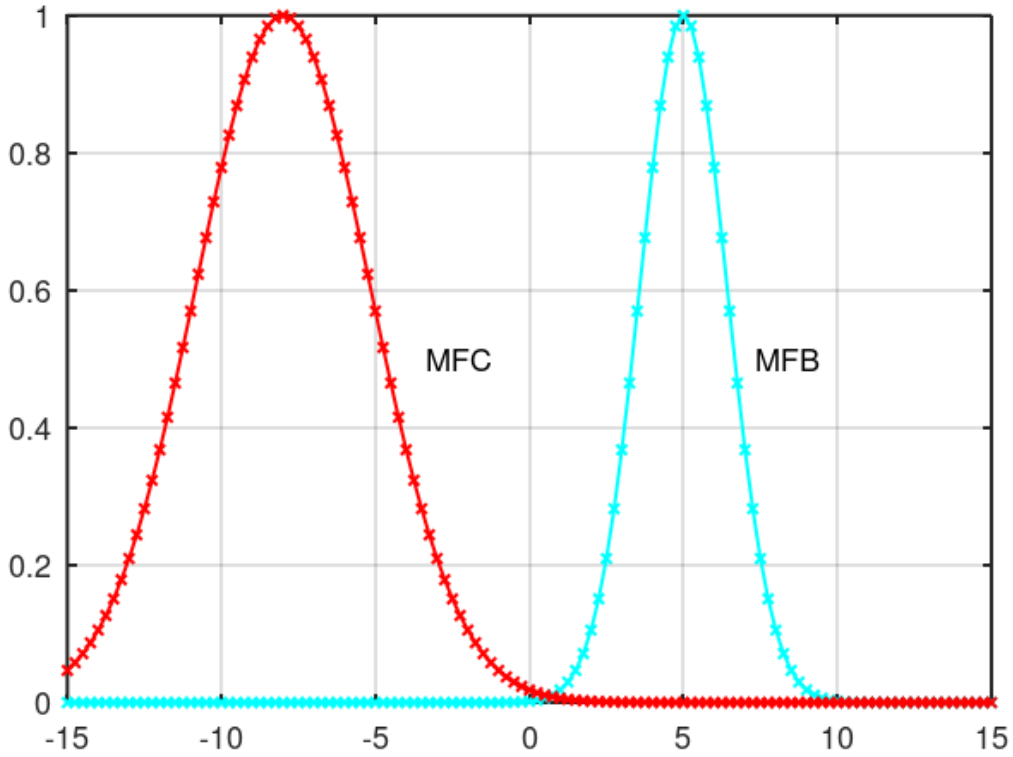

Fig. 4.1. The Gaussian membership functions MFB and MFC

Example 4.2.

Script:

```
% Trapezoidal membership function

y1=0*x1
x2=[0:0.25:3]
y2=1/3*x2
x3=[3:0.25:5]
y3=0*x3+1
x4=[5:0.25:8]
```

```
y4=-1/3*x4+2.667
x5=[8:0.25:15]
y5=0*x5

xa=[x1 x2 x3 x4 x5]
ya=[y1 y2 y3 y4 y5]

plot (xa,ya,'m-x','linewidth', 2)
set(gca,'linewidth',2, 'fontsize',18)
grid on
text(7,0.5,'MFA','fontsize', 18)
```

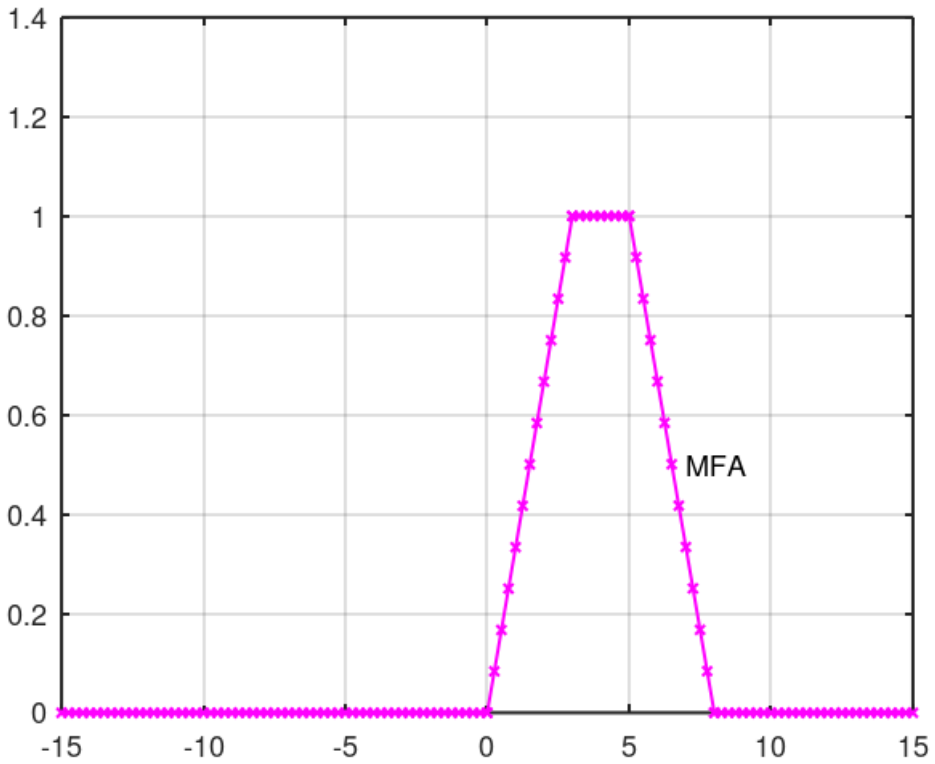

Fig. 4.2. The trapezoidal membership function MFA

core(A) ={ 3 3.25 3.5 3.75 4 4.25
4.5 4.75 5}

core(B) ={5}

core(C) ={-8}

α -cut(A) for α=0.2

α -cut(A) = {
0.75 1 1.25 1.5 1.75 2 2.25
2.5 2.75
3 3.25 3.5 3.75 4 4.25 4.5 4.75 5
5 5.25 5.5 5.75 6 6.25 6.5 6.75 7
7.25 }

α -cut(B) for α=0.5

α -cut(B) = {3.5 3.75 4 4.25 4.5 4.75
5 5.25 5.5 5.75 6 6.25 6.5 }