Principles of Communication Systems Lab
Lab 2 - August 30th, 2017

IMT2015524

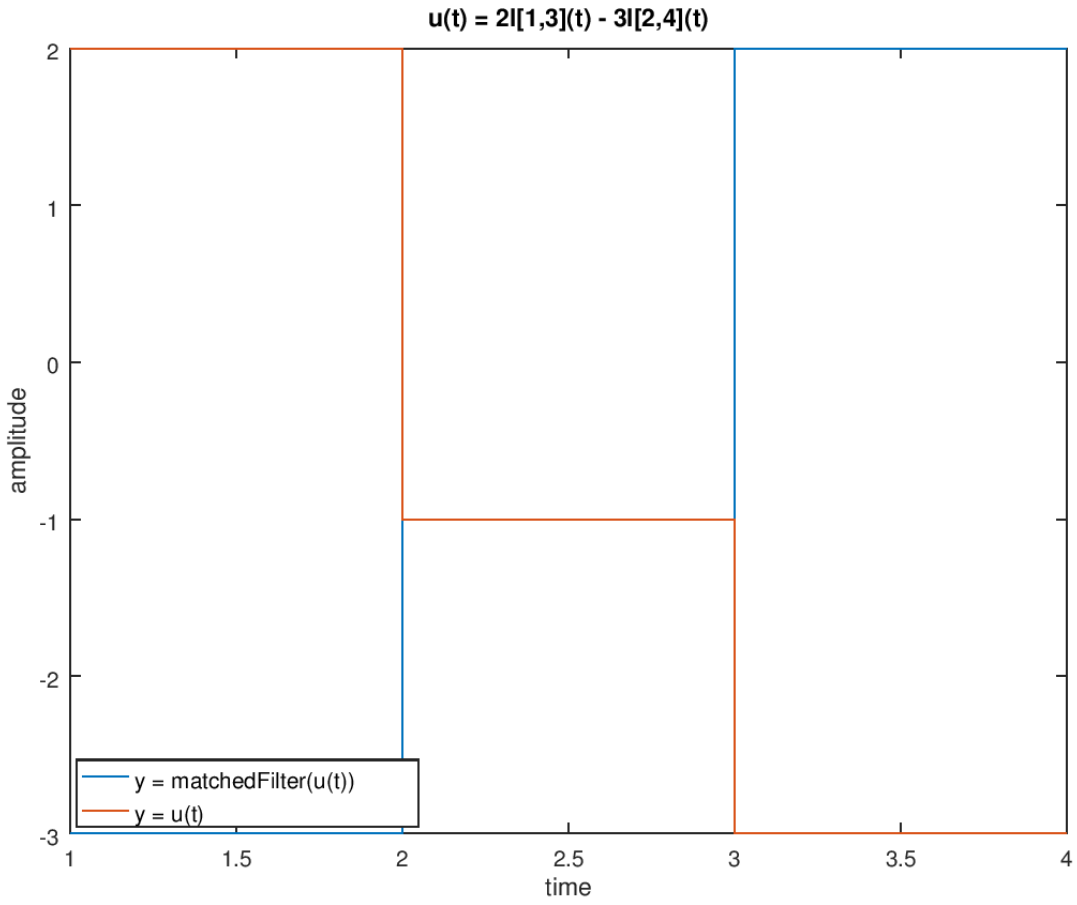
Matched Filter

3 A

Code: https://pastebin.com/jfgMJ90G

```
resolution = 0.001;

first = ones(1/resolution,1);
first = first.*(2);

second = ones(1/resolution, 1);
second = second.*(-1);

third = ones((1/resolution)+1, 1);
third = third.*(-3);

result = vertcat(first, second, third);
filtered = result(end:-1:1);

time = [1:resolution:4];
plot(time, filtered, time, result);

title("u(t) = 2I[1,3](t) - 3I[2,4](t)");

xlabel ("time");
ylabel ("amplitude");

legend("y = matchedFilter(u(t))", "y = u(t)", "Location", "southwest");
```

Plot


u(t) = 2l[1,3](t) - 3l[2,4](t)
amplitude
time
y = matchedFilter(u(t))
y = u(t)
2
1
0
-1
-2
-3
1
1.5
2
2.5
3
3.5
4

3 B

Code: https://pastebin.com/7B6ftvf0

```
function [convolution, time] = contconv (x1, x2, t1, t2, dt)
  % continous convolution
  Tstart1 = t1;
  Tstop1 = t1 + length(x1)*dt - dt;

  Tstart2 = t2;
  Tstop2 = t2 + length(x2)*dt - dt;

  startTime = Tstart1 + Tstart2;
  endTime = Tstop1 + Tstop2;

  time = startTime:dt:endTime;
  t = 1
  convolution = conv(x1,x2).*dt;
endfunction

function [time, result, filtered] = getSignalPair ()
  % get signal and filtered signal
  resolution = 0.001;

  first = ones(1/resolution,1);
  first = first.*(2);

  second = ones(1/resolution, 1);
  second = second.*(-1);

  third = ones((1/resolution)+1, 1);
  third = third.*(-3);

  result = vertcat(first, second, third);
  filtered = result(end:-1:1);

  time = [1:resolution:4];
endfunction

[time, signal, filtered] = getSignalPair();

[result, time] = contconv(signal, filtered, time(1), time(1),
0.001);
plot(time, result);
```