PAC Signal

Explanation of signal paramaters

Generation of PAC signal and its processing are described here

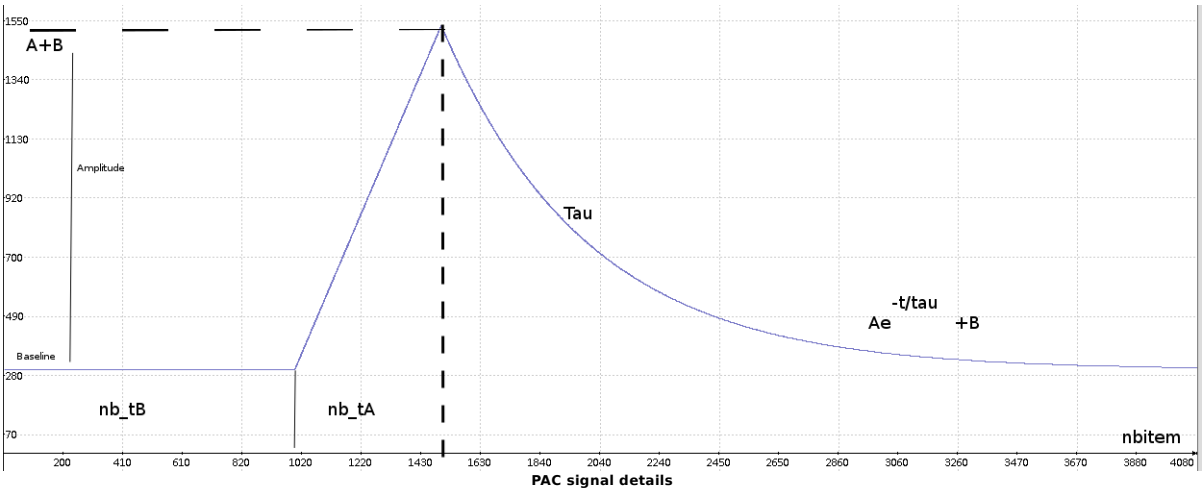
Compile & execute the program

```
GEN_FCT=signal_pac
PROC=filter
make process_sequentialX
make process_sequentialX_run
```

Line to change & commands to type

- Makefile :
  GEN_FCT = name of the signal to be generated (in our case "signal_pac")
  PROC = name of the processor (in our case "filter")
- Terminal :
  make process_sequentialX = create the executable that will generate, process the signal
  make process-sequentialX_run = launch the executable who print and dispay the results with CImg
  make process_sequentialX_run
  ncgen parameters.cdl -o parameters.nc && rm sample_sequential.nc; ./process_sequential.X -s 4096 -o sample_sequential.nc -r result_sequential.nc –generator-factory signal_pac –CPU-factory filter -n 12 –use-GPU –GPU-factory discri –do-check –show && ncdump -h sample_sequential.nc
  Ncgen allow to find the paramaters in the .cdl file

Generation of PAC signal

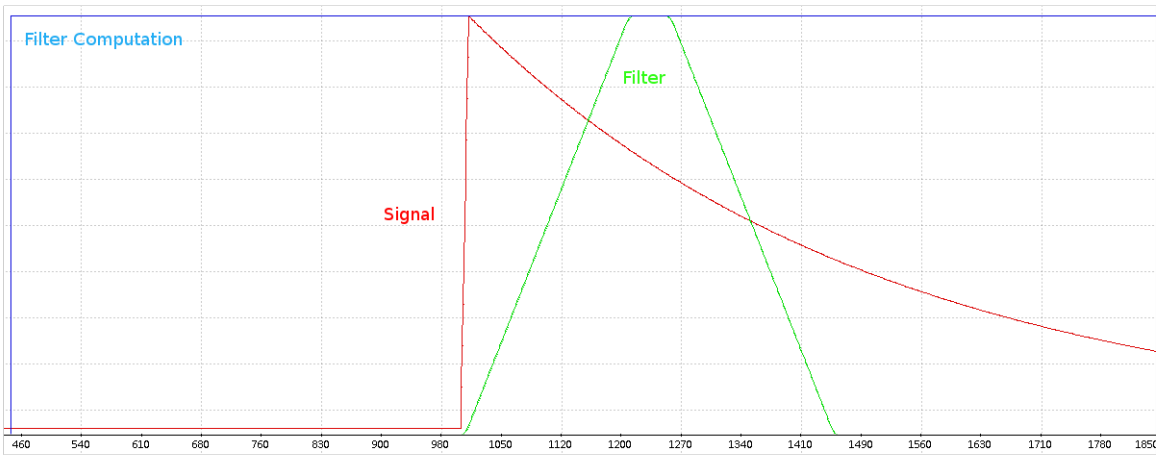


PAC signal details

Graphic legend :

- blue curve : signal pac values (y axis)
- B: Baseline (20)
- A: Amplitude (1234)
- nb_tA: peak duration (10)
- nb_tB: baseline duration (1000)
- Tau: decrease time (500) A * exp(-t/tau)+B: Exponential decrease
- nbitem: size of frame (x axis) (4096)

PAC signal processing



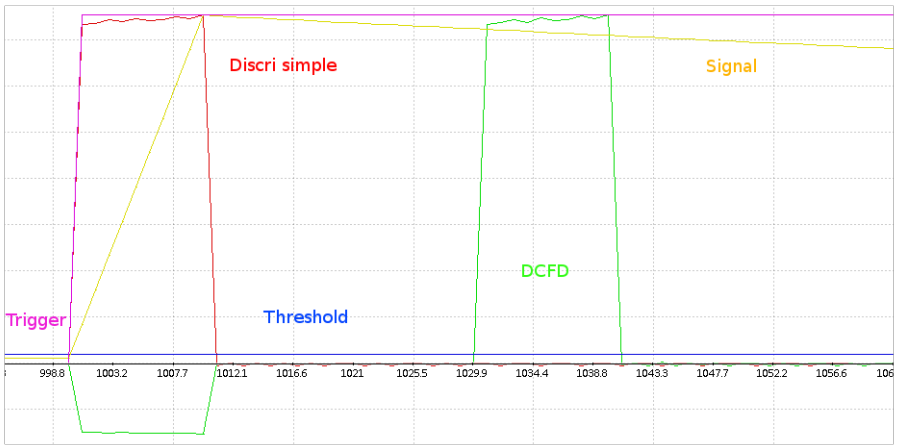
Trapezoidal filter details

Graphic legend :

- Signal: Signal Pac representation
- Filter: show the energy with the formula :
  *s(n)=2*s(n-1)-s(n-2) + e(n-1)-alp*e(n-2) -e(n-(ks+1)) +alp*e(n-(ks+2))-e(n-(ks+ms+1))+alp*e(n-(ks+ms+2))+e(n-(2*ks+ms+1))-alp*e(n-(2*ks+ms+2))*
  where alp=alpha ; s= trapezoidal; e=signal pac ; ks = increase size ; ms = plateau size;

Note

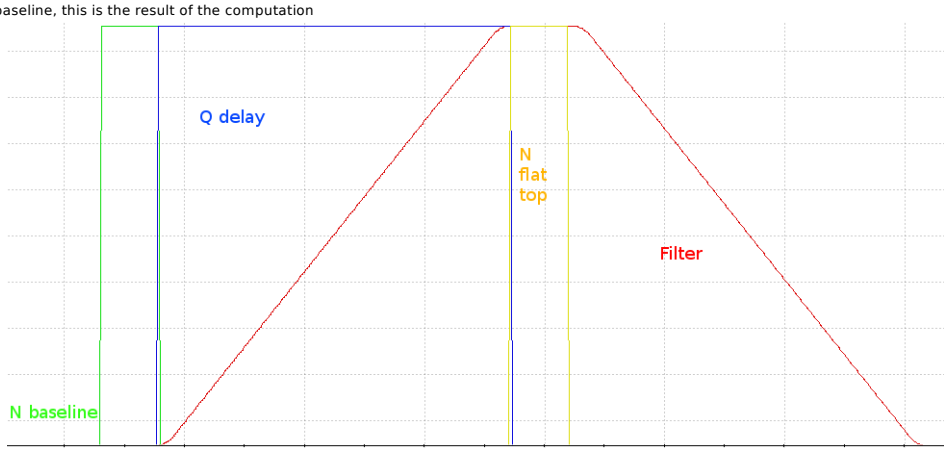
Filter Computation: Represent the part where computation of the filter is done



discri details

Graphic legend :

- DCFD: (n-delay)-frac*s(n)
- Discri simple: e(n)-alp*e(n-1)
- Threshold : value who serve as reference
- Signal : Signal Pac representation
- Trigger : end of the baseline, this is the result of the computation



Paramaters filter trapezoidal details

Graphic legend :

- N baseline : n values of baseline

- Q delay : Time between the trigger and the max
- N flat top : n values at max
- Filter : trapezoidal filter
