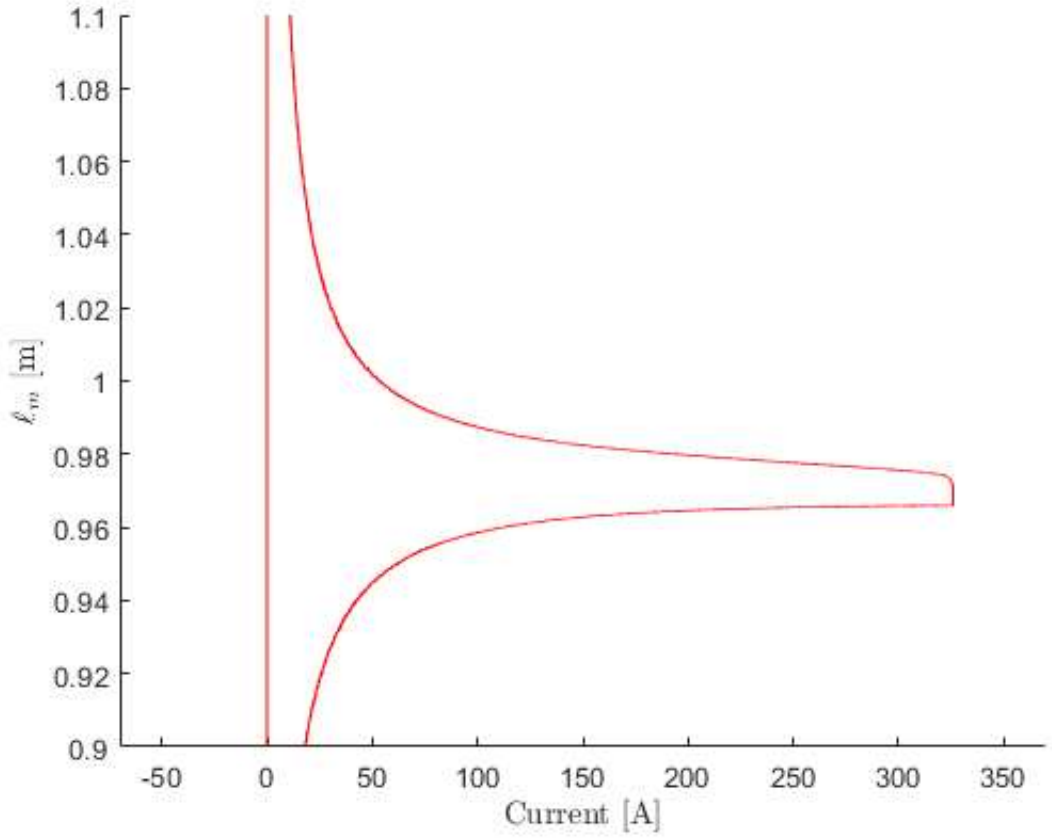
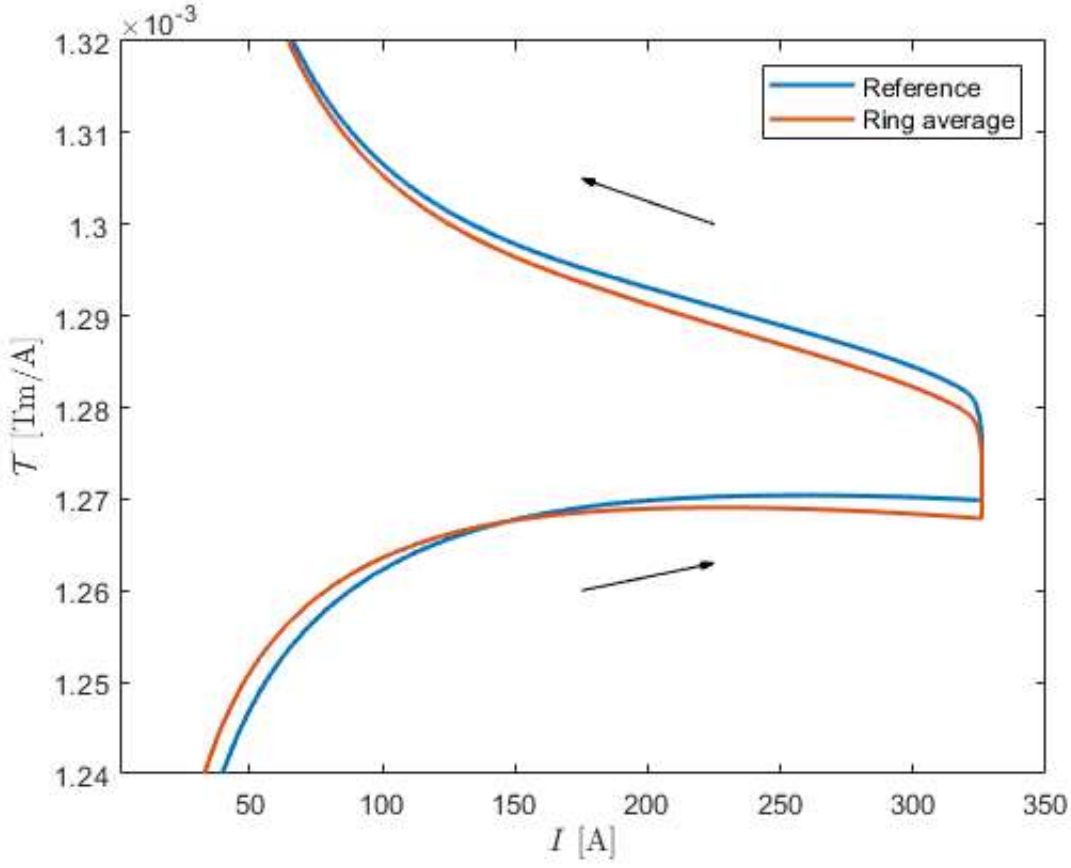
```
clear all;
close all;

%testfolder = 'E:\CERNBox\ELENA tests\MATLAB\Commissioning\matlab\scripts+mmm\ELENA\';
testfolder = 'C:\Users\Dell\cernbox2\Commissioning\Measurement model\Scaling factor\scri
pts+mmm\ELENA\';
filelist = findtaggedfile(testfolder,'xmeter3_coil5_pos5','txt','multi',RECURSE.ON); nf
= length(filelist);
%load('200data');
%load('PBMD2data')
% remanent field
Flux0 = [0.001639, 0.0019126, 0.0019468, 0.0018651, 0.0023044, 0.0020895, 0.002134, 0.00
185];
wc = 2.8579;
load('model_up')
load('model_down')
% --------- analysis parameters --------------
np     =  300000;
kDCCT  =  1;
kH     = -1;
% wc     =  2.8579; % coil effective width
refine =  1.0; % interpolation refinement ratio
l0     =  0.9708; % nominal (hard-edge) magnetic length

% --------- preallocate signal arrays ---------
t       = zeros(np,nf);   iav = 9;
I       = zeros(np,nf);
I200      = zeros(np,nf);
IPBMD2       = zeros(np,nf);
Vc      = zeros(np,nf);
BdL     = zeros(np,nf);
Bavg    = zeros(np,nf);
Lm      = zeros(np,nf);
TF      = zeros(np,nf);
V0      = zeros(1 ,nf);
delay   = zeros(1 ,nf);   % delay wrt mid=3 (first magnet in the ring)
mname   =  cell(1 ,nf+1);   mname{iav}='Ring Average'; mname{10}='Cycle Editor';

for f=1:nf,

    mid         = getRXnum(getFileName(filelist{f}),'(?<=MBR)[0-9]+');
    mname{mid}  = sprintf('MBR%d',mid);     if mid==1,    mname{mid}='Reference'; end
                                            if mid==2,    mname{mid}=[mname{mid}, ' (spa
re)']; end

    raw         = importdata(filelist{f});

      t(:,mid) =           raw.data(1:np,1);     dt=t(2,mid)-t(1,mid);
     Vc(:,mid) =           raw.data(1:np,2);
      I(:,mid) = kDCCT*lpf(raw.data(1:np,3),dt,200);
     B0(:,mid) =        kH*raw.data(1:np,4);

   Idot(:,mid) = derivative(t(:,mid),I(:,mid));
 %    V0(mid) = mean(Vc(1:7*5000,f));    % voltage offset computed directly at the start
 of the measurement
          flux = dt*cumtrapz(Vc(:,mid));
      V0(mid) = (flux(end)-flux(1))/(dt*(np-1));
    Phi(:,mid) = (Flux0(mid) + dt*cumtrapz(Vc(:,mid) - V0(mid)));
    BdL(:,mid) = Phi(:,mid)/wc;
```

```
     Lm(:,mid) =      BdL(:,mid)./B0(:,mid);
     TF(:,mid) = clip(BdL(:,mid)./ I(:,mid),[1.1e-3,1.5e-3]);

end

% % ----- machine mean (requires interpolation and delay) -----------------

dT   = dt/refine;
T    = dT*(1:refine*np);
I_   = zeros(refine*np,nf+1);   I_(:,3) = linterp(t(:,3),I(:,3),T);
B0_  = zeros(refine*np,nf+1);
BdL_ = zeros(refine*np,nf+1);
TF_  = zeros(refine*np,nf+1);
Lm_  = zeros(refine*np,nf+1);

for f=1:nf

    delay(f) = dT*finddelay(linterp(t(:,f)         ,I(:,f),T),I_(:,3));

    I_  (:,f)  =           linterp(t(:,f)+delay(f),  I(:,f),T);
    B0_ (:,f)  =           linterp(t(:,f)+delay(f), B0(:,f),T);
    BdL_(:,f)  =           linterp(t(:,f)+delay(f),BdL(:,f),T);
    TF_ (:,f)  =           linterp(t(:,f)+delay(f), TF(:,f),T);
    Lm_ (:,f)  =           linterp(t(:,f)+delay(f), Lm(:,f),T);

end


    I_(:,iav) = mean(  I_(:,3:8),2);
   Lm_(:,iav) = mean( Lm_(:,3:8),2);
   B0_(:,iav) = mean( B0_(:,3:8),2);
  BdL_(:,iav) = mean(BdL_(:,3:8),2);
   TF_(:,iav) = mean(TF_(:,3:8),2);

ratio_avg_ref = clip(BdL_(:,iav)./BdL_(:,1),[0,2]);
ratio_avg_spr = clip(BdL_(:,iav)./BdL_(:,2),[0,2]);

% ------------------ plots ------------------------------------------------------------
----------------------------------

 mid=[1:nf];


   xyplot([],      I(1:100e3,1),      Lm(1:100e3,1),  ' '    ,'Current [A]'     ,'$\ell_
m$ [m]'     ,''); %grid on;
    new_axes = gca();
    new_axes.XAxis.Label.Interpreter = 'latex';
   new_axes.YAxis.Label.Interpreter = 'latex';
   ylim([0.9 1.1]);

 mid=[1,iav];


 figure;
     plot(I_(:,mid),TF_(:,mid), 'LineWidth',1.5);

ylabel('$\mathcal{T}$ [Tm/A]','interpreter','latex');
xlabel('$I$ [A]','interpreter','latex');  ylim([1.24e-3 1.32e-3])
arrow([175, 1.26e-3],[225, 1.263e-3], 'Length',6);
arrow([225, 1.3e-3],[175, 1.305e-3], 'Length',6);
 legend('Reference',  'Ring average'); xlim([1 350]);
```





Published with MATLAB® R2018b