Intro

In this scrip, we just try to test the calcualtion of residual (残差) . This version uses 4 parameters: m, zeta, psi and H. The ranges of parameters come from fv1_range_confirming.

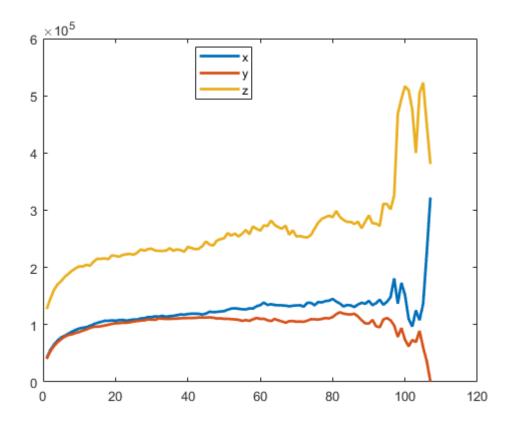
With using Bisection method can not get the correct parameter, we try to add the sampling frequency, and it becomes grid search method.

Import data and previewing

```
data_name='p47_5s'

data_name =
   'p47_5s'

load(['C:\Users\dell\Desktop\zq\MSDData4Quan_20210905\MSD_',data_name,'_All.mat'])
plot(MSD_p47_5s_All.MSD_PP,'LineWidth',2)
legend('x','y','z','Location',"best");
```



cut down the declining part, we delete all data after the maximum one.

```
Reserved_lengths=zeros(3,1);
experiment_interval=5
```

experiment_interval = 5

X part

```
%experiment_MSDX=eval(['MSD_',data_name,'_All']).MSD_PP(:,1);
%max_experiment_MSDX=max(experiment_MSDX);
Reserved_lengths(1,1)=find(MSD_p47_5s_All.MSD_PP(:,1)==max(MSD_p47_5s_All.MSD_PP(:,1)));
interceptive_experiment_MSDX=1e-18*MSD_p47_5s_All.MSD_PP(1:Reserved_lengths(1,1),1);
```

Y part

```
%Reserved_lengths(2,1)=find(eval(['MSD_',data_name,'_All']).MSD_PP(:,2)==max(eval(['MSD_',data_
%interceptive_experiment_MSDY=eval(['MSD_',data_name,'_All']).MSD_PP(1:Reserved_lengths(2,1),2
```

Z part

```
%Reserved_lengths(3,1)=find(eval(['MSD_',data_name,'_All']).MSD_PP(:,3)==max(eval(['MSD_',data_name,'_All']).MSD_PP(1:Reserved_lengths,3);
```

Data Importing

import Time interval

```
delta=0.1;
```

import Total_experiment_number

```
Total_experiment_number=1000;
```

data import

```
Reserved_length=Reserved_lengths(1,1);
interceptive_experiment_MSD=interceptive_experiment_MSDX;
```

Initilizing parameter ranges

initialize H range

```
%H_min=0.52
%H_max=1.0
H=0.75
```

H = 0.7500

initialize m range

```
m_min=2.08929613085404e-09
```

```
m_{\min} = 2.0893e-09
```

```
m_max=9.12010839355909e-09

m_max = 9.1201e-09

initialize psi range

psi_min=5.49280271653059e-08

psi_min = 5.4928e-08

psi_max=1.65722700866999e-06

psi_max = 1.6572e-06

initialize zeta range

zeta_min=1.97659458086867e-08

zeta_min = 1.9766e-08

zeta_max = 7.72240903048428e-08

zeta_max = 7.7224e-08
```

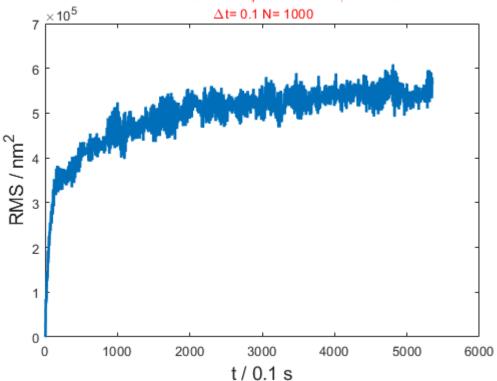
Initilaize grid searching

```
sampling frequency=5;
sample_m=zeros(sampling_frequency,1);
sample_psi=zeros(sampling_frequency,1);
sample_zeta=zeros(sampling_frequency,1);
for i=1:sampling_frequency
    sample m(i)=exp(log(m min)+(log(m max)-log(m min))*(i-1)/sampling frequency);
    sample_psi(i)=exp(log(psi_min)+(log(psi_max)-log(psi_min))*(i-1)/sampling_frequency);
    sample_zeta(i)=exp(log(zeta_min)+(log(zeta_max)-log(zeta_min))*(i-1)/sampling_frequency);
end
residual_compare=zeros(sampling_frequency,sampling_frequency);
for i m=1:sampling frequency
    m=sample m(i m);
    for i_psi=1:sampling_frequency
        psi=sample psi(i psi,1);
        for i_zeta=1:sampling_frequency
            zeta=sample zeta(i zeta,1);
            disp(['trying i_m=',num2str(i_m,1),', trying i_\psi=',num2str(i_psi),', trying i_\rangle
            residual_compare(i_m,i_psi,i_zeta)=function_residual_calculating_fv1(Reserved_leng
        end
    end
end
```

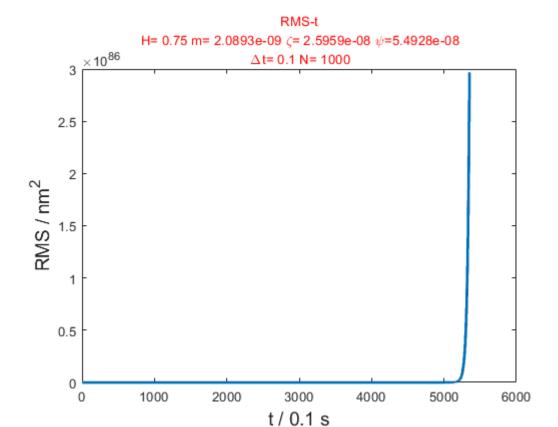
```
trying i_m=1, trying i_\psi=1, trying i_\zeta=1, total sampling number=5
progress rate 10 %
progress rate 20 %
```

```
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %
```

RMS-t H= 0.75 m= 2.0893e-09 ζ = 1.9766e-08 ψ =5.4928e-08 Δt = 0.1 N= 1000



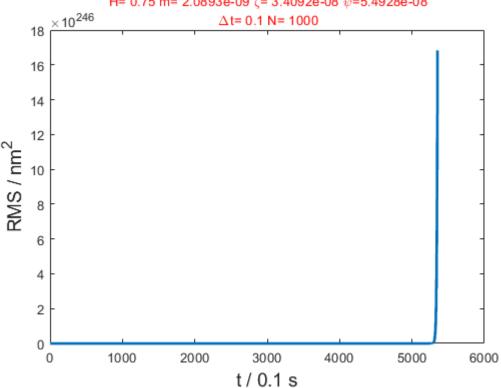
trying i_m=1, trying i_\psi=1, trying i_\zeta=2, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %



explosion! trying i_m=1, trying i_\psi=1, trying i_\zeta=3, total sampling number=5 progress rate 10 %

progress rate 10 % progress rate 20 % progress rate 30 % progress rate 50 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 2.0893e-09 ζ = 3.4092e-08 ψ =5.4928e-08 Δt = 0.1 N= 1000



explosion!

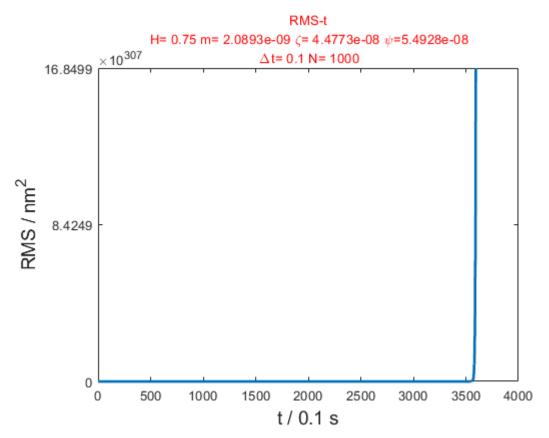
progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 %

trying i_m=1, trying i_\psi=1, trying i_\zeta=4, total sampling number=5

progress rate 50 % progress rate 60 % progress rate 70 %

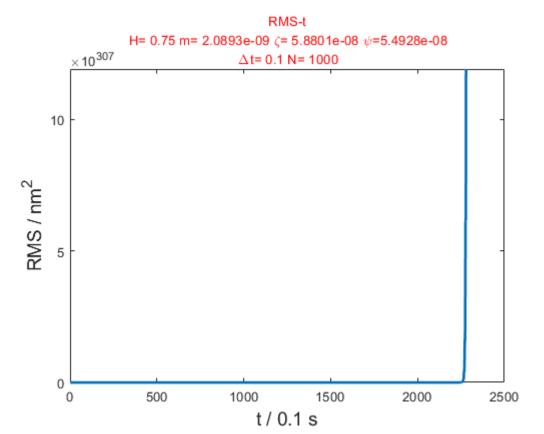
progress rate 80 % progress rate 90 %

progress rate 100 %



explosion!

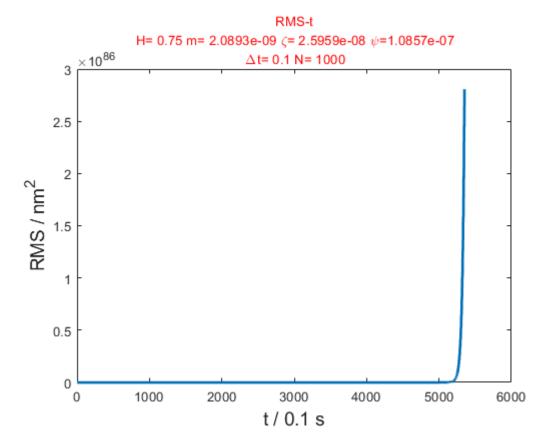
```
trying i_m=1, trying i_\psi=1, trying i_\zeta=5, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %
```



explosion! trying i_m=1, trying i_\psi=2, trying i_\zeta=1, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

t / 0.1 s

trying i_m=1, trying i_\psi=2, trying i_\zeta=2, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

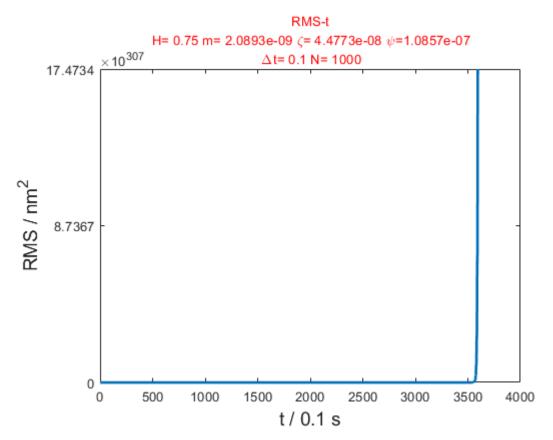


explosion! trying i_m=1, trying i_\psi=2, trying i_\zeta=3, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 2.0893e-09 ζ = 3.4092e-08 ψ =1.0857e-07 18 × 10 246 Δt = 0.1 N= 1000

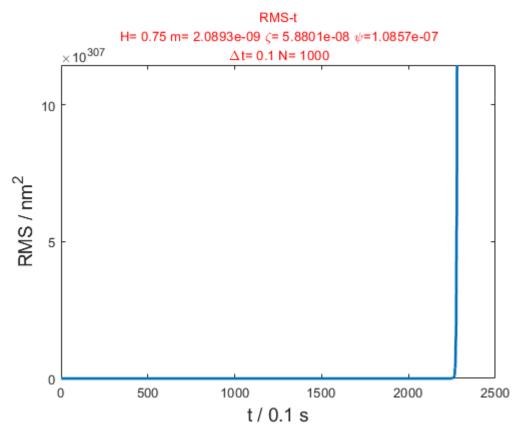
t / 0.1 s

explosion! trying i_m=1, trying i_\psi=2, trying i_\zeta=4, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %



explosion!

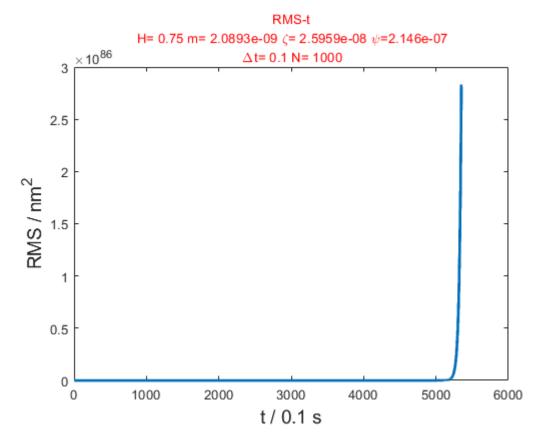
```
trying i_m=1, trying i_\psi=2, trying i_\zeta=5, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %
```



explosion! trying i_m=1, trying i_\psi=3, trying i_\zeta=1, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 2.0893e-09 ζ = 1.9766e-08 ψ =2.146e-07 7 × 10⁵ Δt = 0.1 N= 1000 RMS / nm² t / 0.1 s

```
trying i_m=1, trying i_\psi=3, trying i_\zeta=2, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %
```

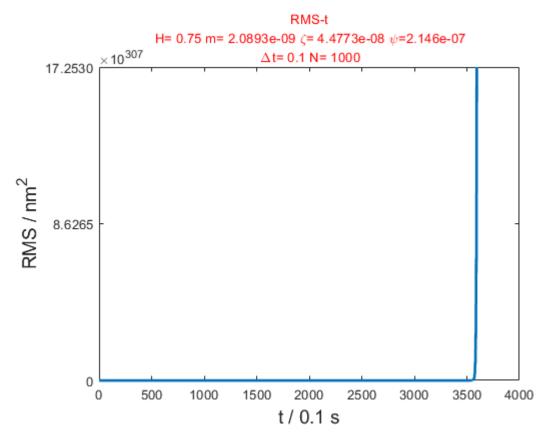


explosion! trying i_m=1, trying i_\psi=3, trying i_\zeta=3, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 2.0893e-09 ζ = 3.4092e-08 ψ =2.146e-07 18 × 10 246 Δt = 0.1 N= 1000

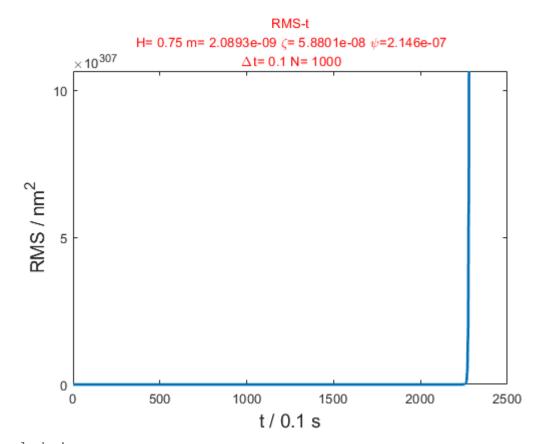
t / 0.1 s

explosion! trying i_m=1, trying i_\psi=3, trying i_\zeta=4, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %



explosion!

trying i_m=1, trying i_\psi=3, trying i_\zeta=5, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %



progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 2.0893e-09 ζ = 1.9766e-08 ψ =4.2418e-07 7 × 10⁵ Δt = 0.1 N= 1000 RMS / nm²

t / 0.1 s

trying i_m=1, trying i_\psi=4, trying i_\zeta=2, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 2.0893e-09 ζ = 2.5959e-08 ψ =4.2418e-07 3 × 10 86 Δt = 0.1 N= 1000 2.5 2 RMS / nm^2 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000

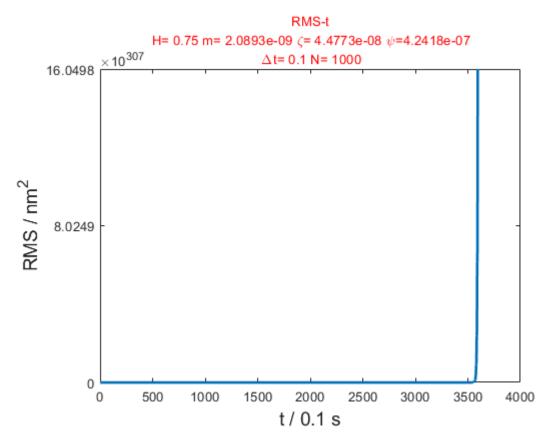
t / 0.1 s

explosion! trying i_m=1, trying i_\psi=4, trying i_\zeta=3, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 2.0893e-09 ζ = 3.4092e-08 ψ =4.2418e-07 16 × 10 246 Δt = 0.1 N= 1000

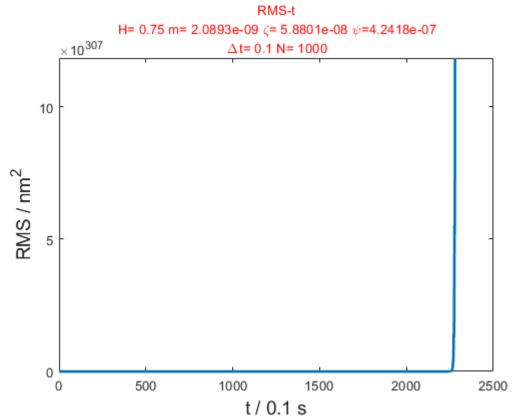
t / 0.1 s

explosion! trying i_m=1, trying i_\psi=4, trying i_\zeta=4, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %



explosion!

trying i_m=1, trying i_\psi=4, trying i_\zeta=5, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

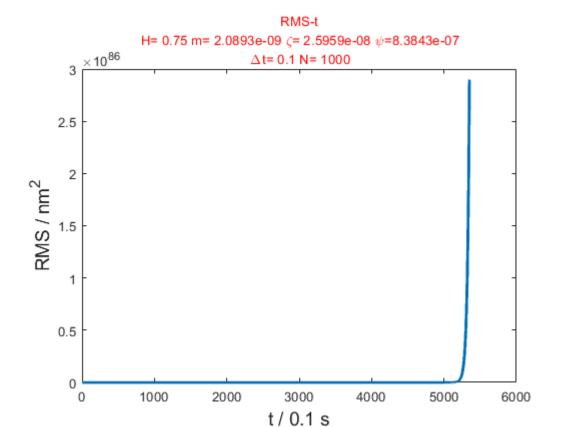


explosion! trying i_m=1, trying i_\psi=5, trying i_\zeta=1, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 2.0893e-09 ζ = 1.9766e-08 ψ =8.3843e-07 7 × 10⁵ Δt = 0.1 N= 1000 RMS / nm²

t / 0.1 s

```
trying i_m=1, trying i_\psi=5, trying i_\zeta=2, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %
```



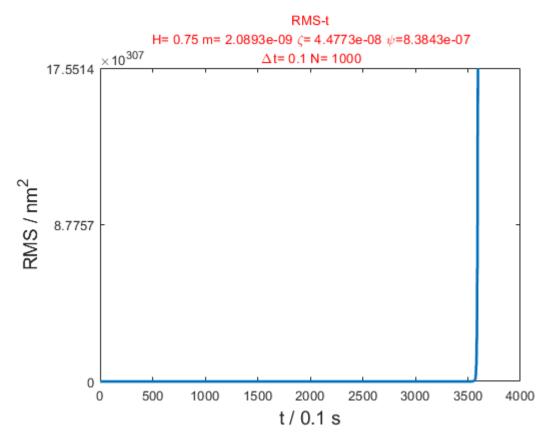
explosion! trying i_m=1, trying i_\psi=5, trying i_\zeta=3, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t
H= 0.75 m= 2.0893e-09 ζ= 3.4092e-08 ψ=8.3843e-07
Δt= 0.1 N= 1000

18
16
14
12
12
10
8
4
4
2

t / 0.1 s

explosion! trying i_m=1, trying i_\psi=5, trying i_\zeta=4, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %



explosion!

```
trying i_m=1, trying i_\psi=5, trying i_\zeta=5, total sampling number=5

progress rate 10 %

progress rate 20 %

progress rate 30 %

progress rate 40 %

progress rate 50 %

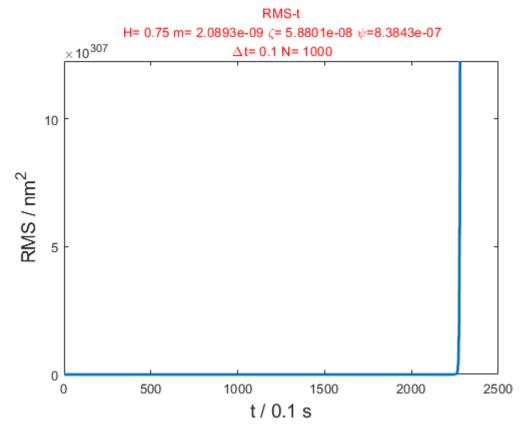
progress rate 60 %

progress rate 70 %

progress rate 80 %

progress rate 90 %

progress rate 100 %
```



explosion! trying i_m=2, trying i_\psi=1, trying i_\zeta=1, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

t / 0.1 s

trying i_m=2, trying i_\psi=1, trying i_\zeta=2, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 2.8054e-09 ζ = 2.5959e-08 ψ =5.4928e-08 ×10⁵ Δt = 0.1 N= 1000 5 4.5 4 3.5 RMS / nm² 3 2.5 2 1.5 1 0.5 0

3000

t / 0.1 s

4000

5000

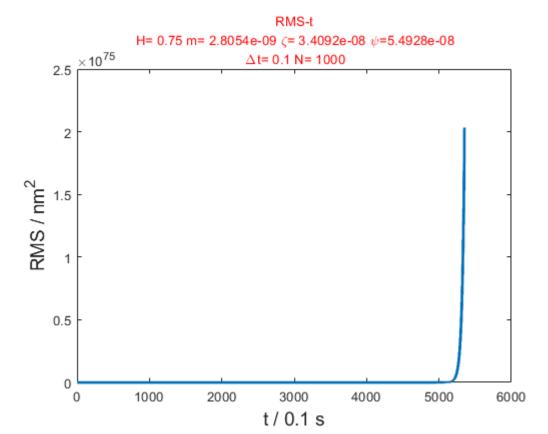
6000

trying i_m=2, trying i_\psi=1, trying i_\zeta=3, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

2000

0

1000

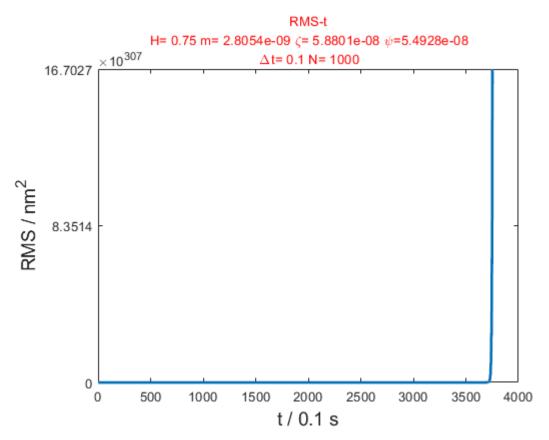


explosion! trying i_m=2, trying i_\psi=1, trying i_\zeta=4, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 2.8054e-09 ζ = 4.4773e-08 ψ =5.4928e-08 16 × 10 231 Δt = 0.1 N= 1000

t / 0.1 s

explosion! trying i_m=2, trying i_\psi=1, trying i_\zeta=5, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %



explosion!

trying i_m=2, trying i_\psi=2, trying i_\zeta=1, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 2.8054e-09 ζ= 1.9766e-08 ψ=1.0857e-07 4.5 ×10⁵ Δt= 0.1 N= 1000 4.5 × 10⁵ Δt= 0.1 N= 1000 1.5 × 10⁵ 1 0.5 × 10⁵ 1

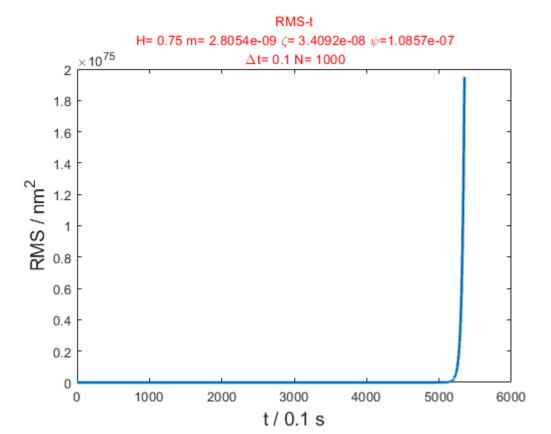
t / 0.1 s

trying i_m=2, trying i_\psi=2, trying i_\zeta=2, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

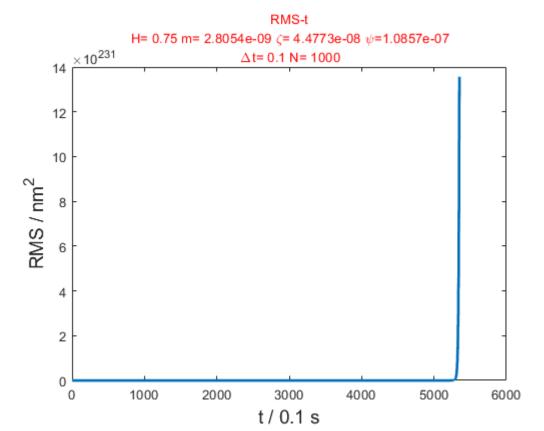
RMS-t H= 0.75 m= 2.8054e-09 ζ = 2.5959e-08 ψ =1.0857e-07 ×10⁵ Δt = 0.1 N= 1000 5 4.5 4 3.5 RMS / nm² 3 2.5 2 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000

t / 0.1 s

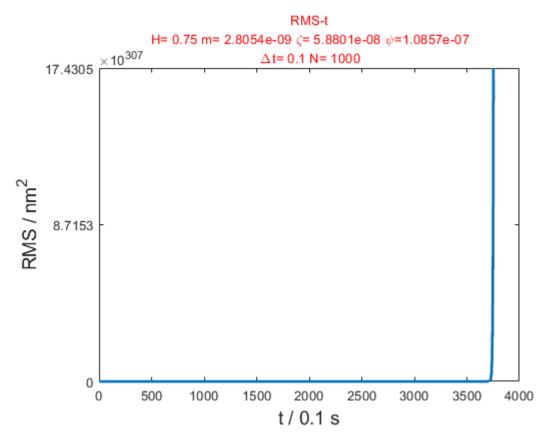
trying i_m=2, trying i_\psi=2, trying i_\zeta=3, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %



explosion! trying i_m=2, trying i_\psi=2, trying i_\zeta=4, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %



explosion! trying i_m=2, trying i_\psi=2, trying i_\zeta=5, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %



explosion!

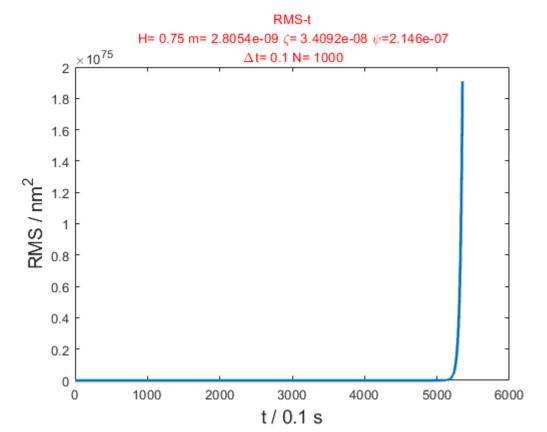
trying i_m=2, trying i_\psi=3, trying i_\zeta=1, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 2.8054e-09 ζ = 1.9766e-08 ψ =2.146e-07 ×10⁵ Δt = 0.1 N= 1000 4.5 4 3.5 3 RMS / nm^2 2.5 2 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000

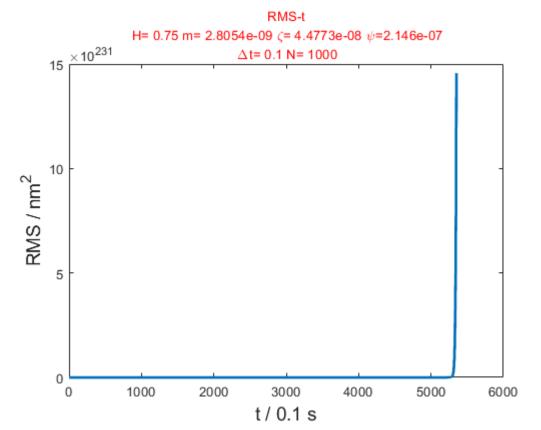
trying i_m=2, trying i_\psi=3, trying i_\zeta=2, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 2.8054e-09 ζ = 2.5959e-08 ψ =2.146e-07 ×10⁵ Δt = 0.1 N= 1000 4.5 4 3.5 2.5 Land 2 MS / nm² 2 Land 2 3 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000

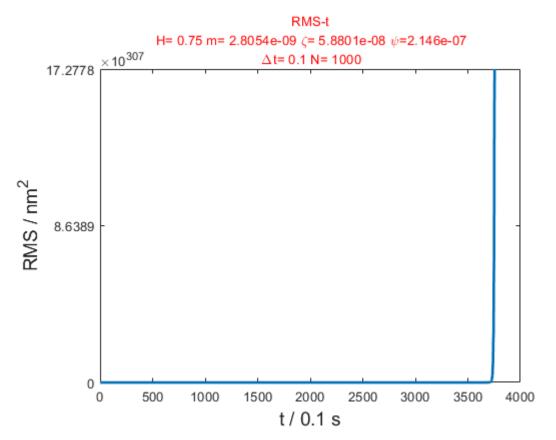
trying i_m=2, trying i_\psi=3, trying i_\zeta=3, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %



explosion! trying i_m=2, trying i_\psi=3, trying i_\zeta=4, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %



explosion! trying i_m=2, trying i_\psi=3, trying i_\zeta=5, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %



explosion!

trying i_m=2, trying i_\psi=4, trying i_\zeta=1, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 2.8054e-09 ζ= 1.9766e-08 ψ=4.2418e-07 4.5 Δt= 0.1 N= 1000 4 3.5 3 2.5 2 1.5 1 0.5

3000

t / 0.1 s

4000

5000

6000

trying i_m=2, trying i_\psi=4, trying i_\zeta=2, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

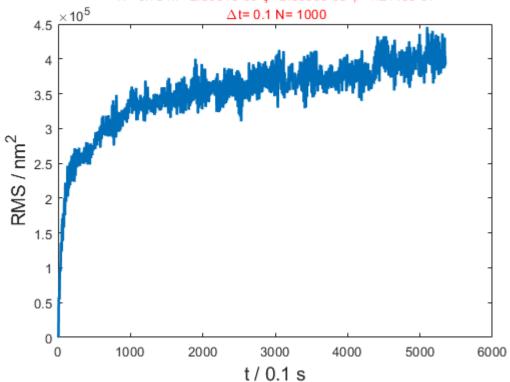
2000

0

0

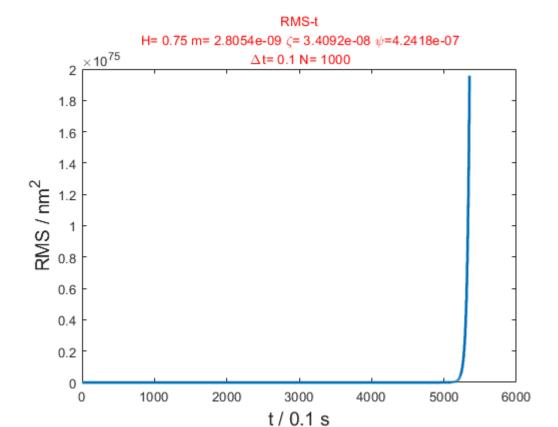
1000

RMS-t H= 0.75 m= 2.8054e-09 ζ = 2.5959e-08 ψ =4.2418e-07 Δ t= 0.1 N= 1000

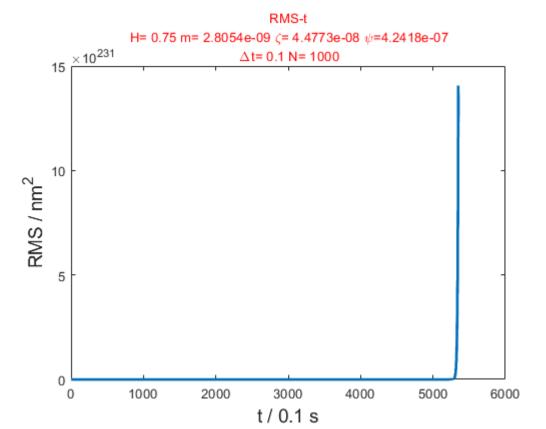


trying i_m=2, trying i_\psi=4, trying i_\zeta=3, total sampling number=5 progress rate 10 %

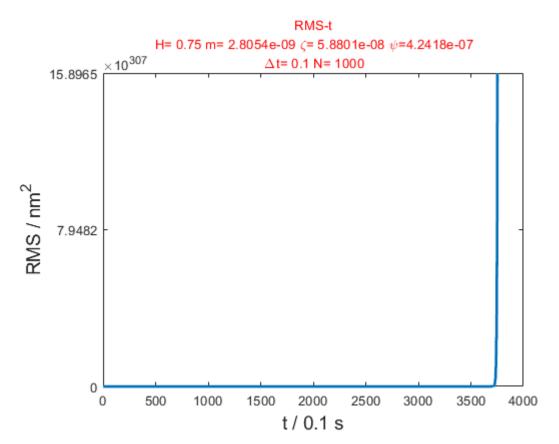
progress rate 10 % progress rate 20 % progress rate 30 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %



explosion! trying i_m=2, trying i_\psi=4, trying i_\zeta=4, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %



explosion! trying i_m=2, trying i_\psi=4, trying i_\zeta=5, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %



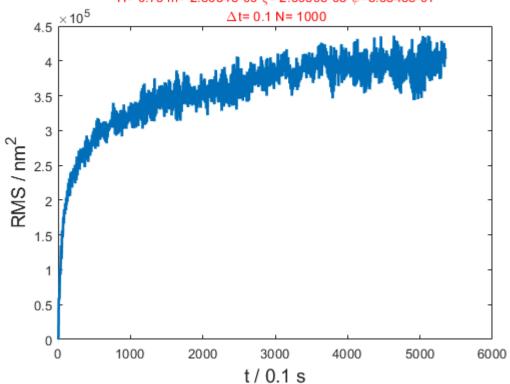
explosion!

trying i_m=2, trying i_\psi=5, trying i_\zeta=1, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 2.8054e-09 ζ = 1.9766e-08 ψ =8.3843e-07 ×10⁵ Δt = 0.1 N= 1000 5 4.5 4 3.5 RMS / nm² 3 2.5 2 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000

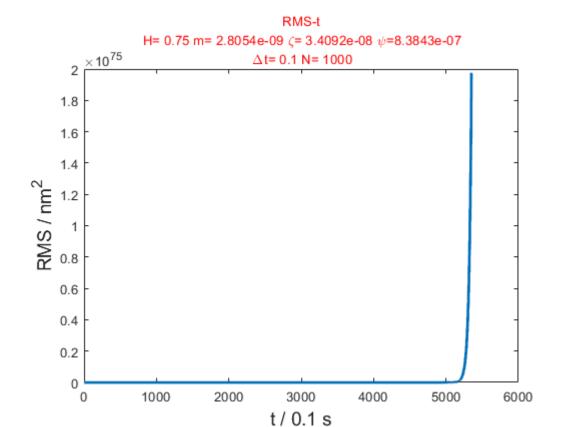
```
trying i_m=2, trying i_\psi=5, trying i_\zeta=2, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %
```

RMS-t H= 0.75 m= 2.8054e-09 ζ = 2.5959e-08 ψ =8.3843e-07

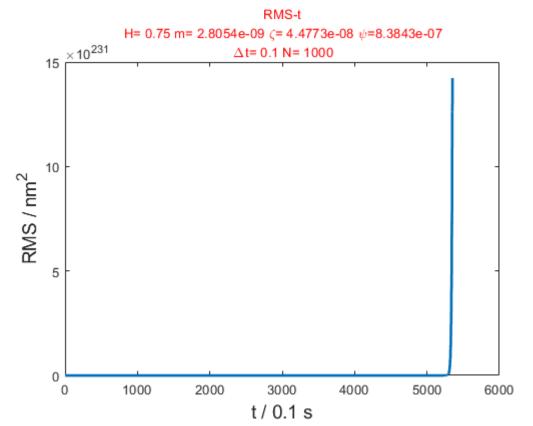


trying i_m=2, trying i_\psi=5, trying i_\zeta=3, total sampling number=5 progress rate 10 %

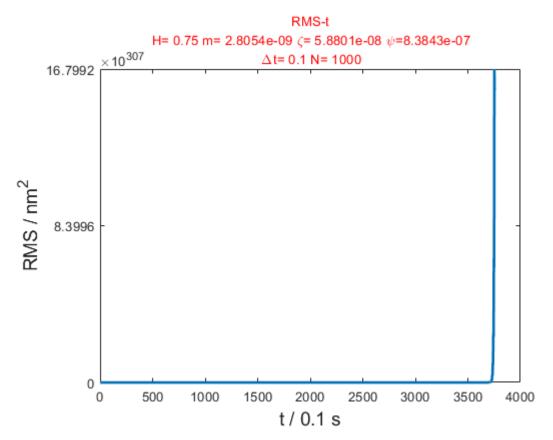
progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %



explosion! trying i_m=2, trying i_\psi=5, trying i_\zeta=4, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %



explosion! trying i_m=2, trying i_\psi=5, trying i_\zeta=5, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %



explosion!

```
trying i_m=3, trying i_\psi=1, trying i_\zeta=1, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %
```

RMS-t H= 0.75 m= 3.767e-09 ζ = 1.9766e-08 ψ =5.4928e-08 ×10⁵ Δt = 0.1 N= 1000 4 3.5 3 ZMS / nm² 1 0.5 0 3000 0 1000 2000 4000 5000 6000

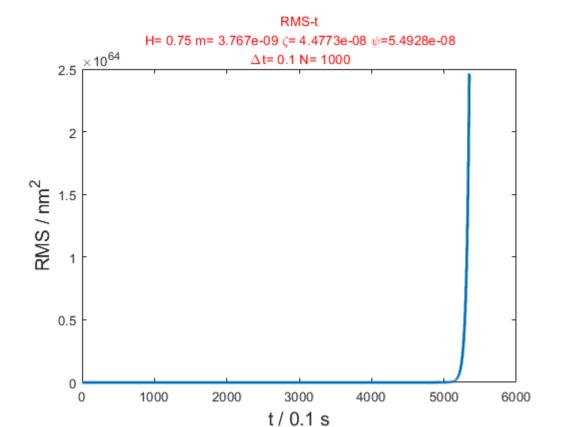
```
trying i_m=3, trying i_\psi=1, trying i_\zeta=2, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %
```

RMS-t H= 0.75 m= 3.767e-09 ζ = 2.5959e-08 ψ =5.4928e-08 3.5 × 10⁵ Δt = 0.1 N= 1000 3 2.5 RMS / nm² 2 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000

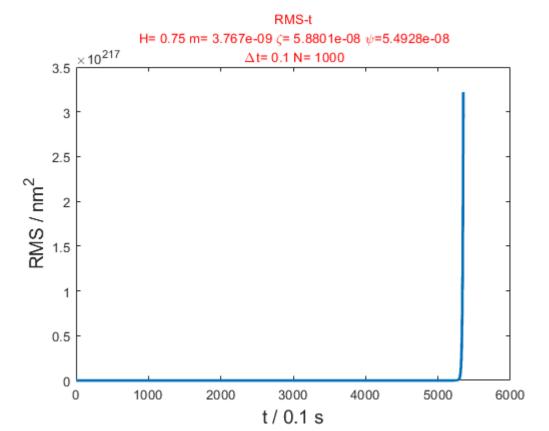
```
trying i_m=3, trying i_\psi=1, trying i_\zeta=3, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %
```

RMS-t H= 0.75 m= 3.767e-09 ζ = 3.4092e-08 ψ =5.4928e-08 3.5 × 10⁵ Δt = 0.1 N= 1000 3 2.5 RMS / nm² 2 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000

trying i_m=3, trying i_\psi=1, trying i_\zeta=4, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %



explosion! trying i_m=3, trying i_\psi=1, trying i_\zeta=5, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %



explosion! trying i_m=3, trying i_\psi=2, trying i_\zeta=1, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 3.767e-09 ζ = 1.9766e-08 ψ =1.0857e-07 4.5 × 10⁵ Δt = 0.1 N= 1000 4 3.5 3 RMS / nm^2 2.5 2 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000

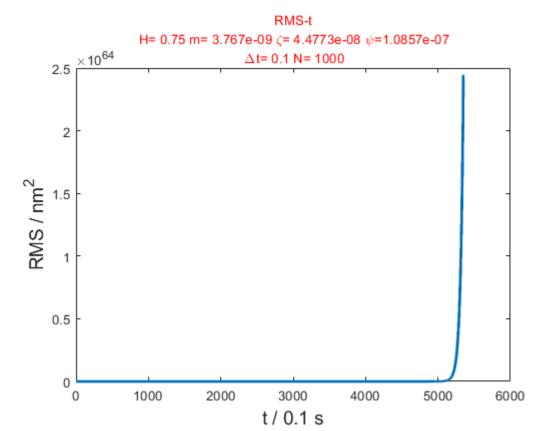
trying i_m=3, trying i_\psi=2, trying i_\zeta=2, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 3.767e-09 ζ = 2.5959e-08 ψ =1.0857e-07 3.5 × 10⁵ Δt = 0.1 N= 1000 3 2.5 RMS / nm² 2 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000

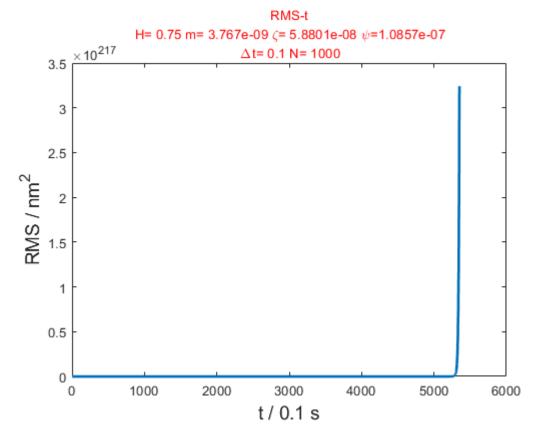
```
trying i_m=3, trying i_\psi=2, trying i_\zeta=3, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %
```

RMS-t H= 0.75 m= 3.767e-09 ζ = 3.4092e-08 ψ =1.0857e-07 3.5 × 10⁵ Δt = 0.1 N= 1000 3 2.5 RMS / nm² 2 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000

trying i_m=3, trying i_\psi=2, trying i_\zeta=4, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %



explosion! trying i_m=3, trying i_\psi=2, trying i_\zeta=5, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %



explosion! trying i_m=3, trying i_\psi=3, trying i_\zeta=1, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 3.767e-09 ζ = 1.9766e-08 ψ =2.146e-07 ×10⁵ Δt = 0.1 N= 1000 4 3.5 3 1 0.5 0 3000 0 1000 2000 4000 5000 6000 t / 0.1 s

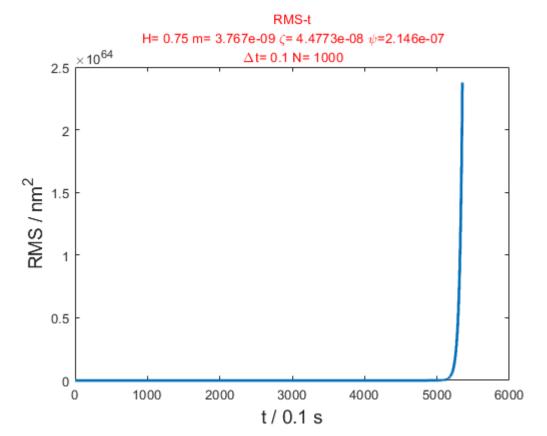
```
trying i_m=3, trying i_\psi=3, trying i_\zeta=2, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %
```

RMS-t H= 0.75 m= 3.767e-09 ζ = 2.5959e-08 ψ =2.146e-07 3.5 × 10⁵ Δt = 0.1 N= 1000 3 2.5 RMS / nm² 2 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000 t / 0.1 s

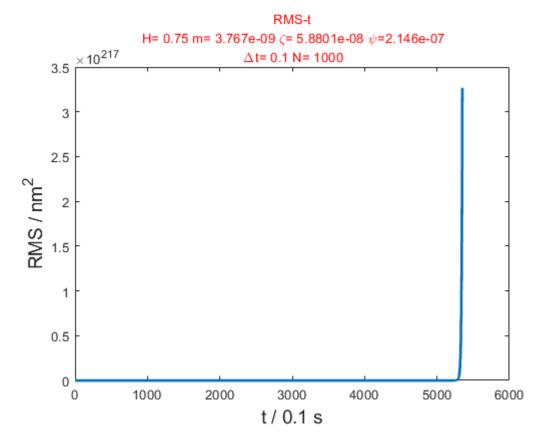
```
trying i_m=3, trying i_\psi=3, trying i_\zeta=3, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %
```

RMS-t H= 0.75 m= 3.767e-09 ζ = 3.4092e-08 ψ =2.146e-07 3.5 × 10⁵ Δt = 0.1 N= 1000 3 2.5 RMS / nm² 2 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000

```
trying i_m=3, trying i_\psi=3, trying i_\zeta=4, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %
```



explosion! trying i_m=3, trying i_\psi=3, trying i_\zeta=5, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %



explosion! trying i_m=3, trying i_\psi=4, trying i_\zeta=1, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 3.767e-09 ζ= 1.9766e-08 ψ=4.2418e-07 Δt= 0.1 N= 1000 3.5 2.5 1 0.5 1 0.5

3000

t / 0.1 s

4000

5000

6000

```
trying i_m=3, trying i_\psi=4, trying i_\zeta=2, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %
```

2000

0

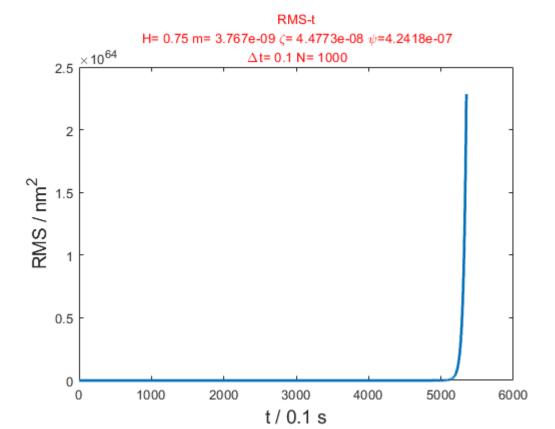
1000

RMS-t H= 0.75 m= 3.767e-09 ζ = 2.5959e-08 ψ =4.2418e-07 3.5 × 10⁵ Δt = 0.1 N= 1000 3 2.5 RMS / nm² 2 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000

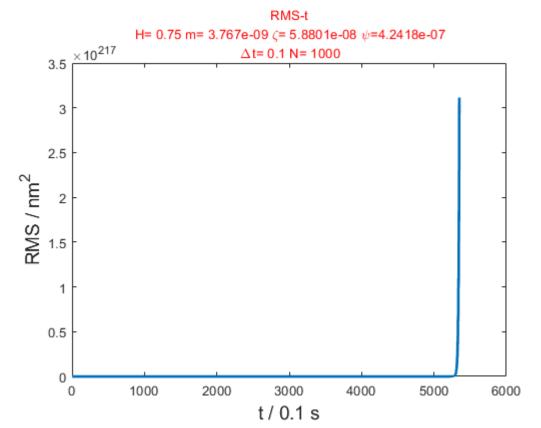
trying i_m=3, trying i_\psi=4, trying i_\zeta=3, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 3.767e-09 ζ = 3.4092e-08 ψ =4.2418e-07 3.5 × 10⁵ Δt = 0.1 N= 1000 3 2.5 RMS / nm^2 2 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000

```
trying i_m=3, trying i_\psi=4, trying i_\zeta=4, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %
```



explosion! trying i_m=3, trying i_\psi=4, trying i_\zeta=5, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %



explosion! trying i_m=3, trying i_\psi=5, trying i_\zeta=1, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 3.767e-09 ζ = 1.9766e-08 ψ =8.3843e-07 ×10⁵ Δt = 0.1 N= 1000 4 3.5 3 1 0.5 0 3000 0 1000 2000 4000 5000 6000

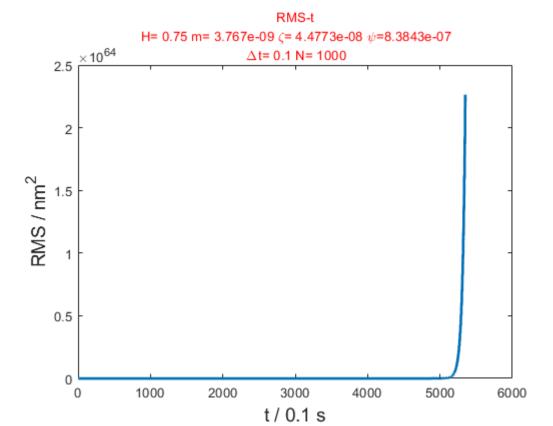
```
trying i_m=3, trying i_\psi=5, trying i_\zeta=2, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %
```

RMS-t H= 0.75 m= 3.767e-09 ζ = 2.5959e-08 ψ =8.3843e-07 3.5 × 10⁵ Δt = 0.1 N= 1000 3 2.5 RMS / nm² 2 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000

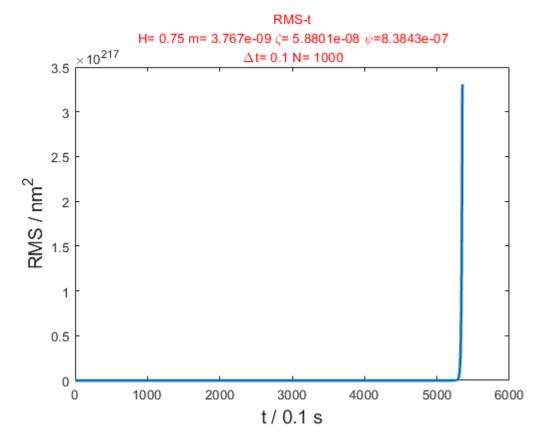
```
trying i_m=3, trying i_\psi=5, trying i_\zeta=3, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %
```

RMS-t H= 0.75 m= 3.767e-09 ζ = 3.4092e-08 ψ =8.3843e-07 3.5 × 10⁵ Δt = 0.1 N= 1000 3 2.5 RMS / nm² 2 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000

trying i_m=3, trying i_\psi=5, trying i_\zeta=4, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %



explosion! trying i_m=3, trying i_\psi=5, trying i_\zeta=5, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %



explosion! trying i_m=4, trying i_\psi=1, trying i_\zeta=1, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 5.0582e-09 ζ = 1.9766e-08 ψ =5.4928e-08 ×10⁵ Δt = 0.1 N= 1000 4 3.5 3 ZMS / nm² 1 0.5 0 3000 0 1000 2000 4000 5000 6000

```
trying i_m=4, trying i_\psi=1, trying i_\zeta=2, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %
```

RMS-t H= 0.75 m= 5.0582e-09 ζ = 2.5959e-08 ψ =5.4928e-08 3.5 × 10⁵ Δt = 0.1 N= 1000 3 2.5 RMS / nm² 2 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000

t / 0.1 s

trying i_m=4, trying i_\psi=1, trying i_\zeta=3, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t
H= 0.75 m= 5.0582e-09 ζ= 3.4092e-08 ψ=5.4928e-08

2.5
Δt= 0.1 N= 1000

2.5
Δt= 0.1 N= 1000

t / 0.1 s

trying i_m=4, trying i_\psi=1, trying i_\zeta=4, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 5.0582e-09 ζ= 4.4773e-08 ψ=5.4928e-08 2.5 Δt= 0.1 N= 1000 2.5 Δt= 0.1 N= 1000

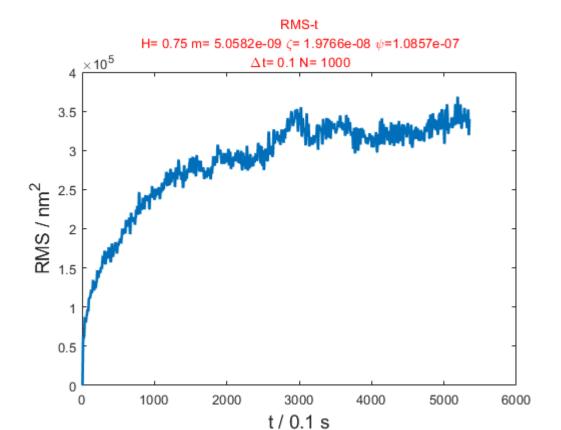
t / 0.1 s

trying i_m=4, trying i_\psi=1, trying i_\zeta=5, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 5.0582e-09 ζ = 5.8801e-08 ψ =5.4928e-08 7 × 10⁵³ Δt = 0.1 N= 1000 RMS / nm²

t / 0.1 s

explosion! trying i_m=4, trying i_\psi=2, trying i_\zeta=1, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %



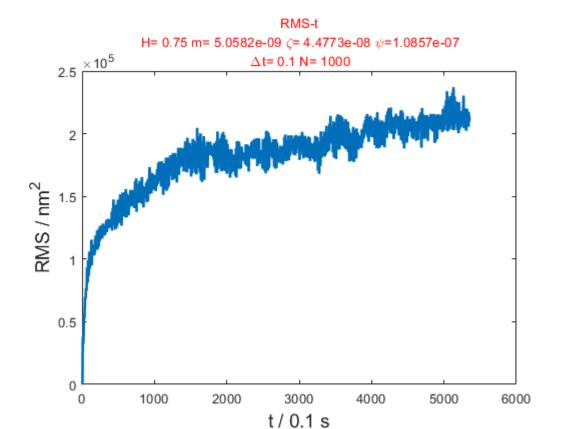
```
trying i_m=4, trying i_\psi=2, trying i_\zeta=2, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %
```

RMS-t H= 0.75 m= 5.0582e-09 ζ = 2.5959e-08 ψ =1.0857e-07 ×10⁵ Δt = 0.1 N= 1000 3 2.5 2 RMS / nm² 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000

```
trying i_m=4, trying i_\psi=2, trying i_\zeta=3, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %
```

RMS-t H= 0.75 m= 5.0582e-09 ζ = 3.4092e-08 ψ =1.0857e-07 2.5 × 10⁵ Δt = 0.1 N= 1000 2 RMS / nm² 1.5 0.5 0 3000 0 1000 2000 4000 5000 6000

```
trying i_m=4, trying i_\psi=2, trying i_\zeta=4, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %
```



RMS-t H= 0.75 m= 5.0582e-09 ζ = 5.8801e-08 ψ =1.0857e-07 7 × 10⁵³ Δt = 0.1 N= 1000 RMS / nm²

t / 0.1 s

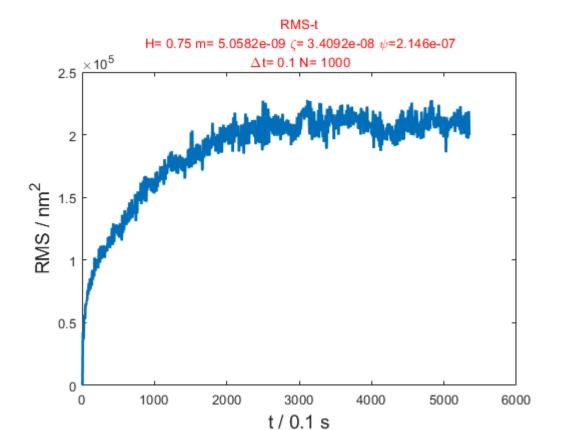
explosion! trying i_m=4, trying i_\psi=3, trying i_\zeta=1, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 5.0582e-09 ζ = 1.9766e-08 ψ =2.146e-07 ×10⁵ Δt = 0.1 N= 1000 4 3.5 3 1 0.5 0 3000 0 1000 2000 4000 5000 6000 t / 0.1 s

```
trying i_m=4, trying i_\psi=3, trying i_\zeta=2, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %
```

RMS-t H= 0.75 m= 5.0582e-09 ζ = 2.5959e-08 ψ =2.146e-07 ×10⁵ Δt = 0.1 N= 1000 3 2.5 2 RMS / nm² 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000

```
trying i_m=4, trying i_\psi=3, trying i_\zeta=3, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %
```

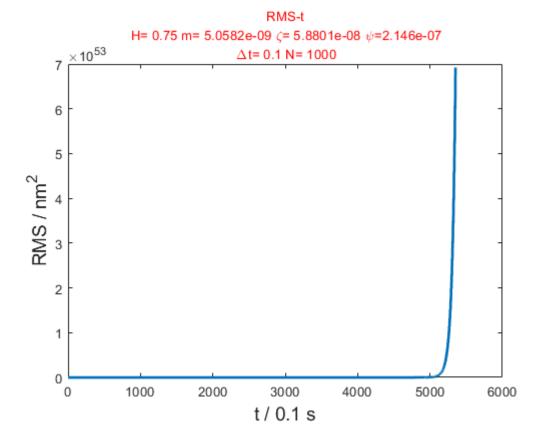


```
trying i_m=4, trying i_\psi=3, trying i_\zeta=4, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %
```

RMS-t H= 0.75 m= 5.0582e-09 ζ = 4.4773e-08 ψ =2.146e-07 2.5 × 10⁵ Δt = 0.1 N= 1000 2 RMS / nm² 1.5 0.5 0 3000 0 1000 2000 4000 5000 6000

t / 0.1 s

trying i_m=4, trying i_\psi=3, trying i_\zeta=5, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %



explosion! trying i_m=4, trying i_\psi=4, trying i_\zeta=1, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

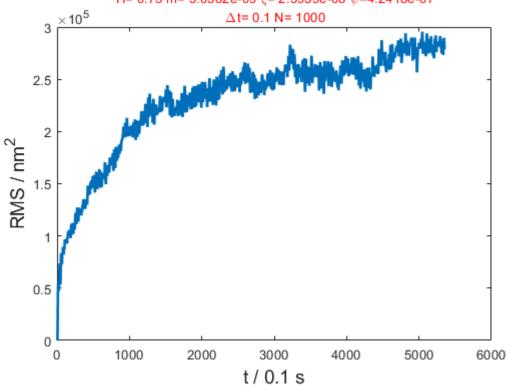
RMS-t
H= 0.75 m= 5.0582e-09 ζ= 1.9766e-08 ψ=4.2418e-07
Δt= 0.1 N= 1000

2.5
2
1.5
1
0.5

t / 0.1 s

```
trying i_m=4, trying i_\psi=4, trying i_\zeta=2, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %
```

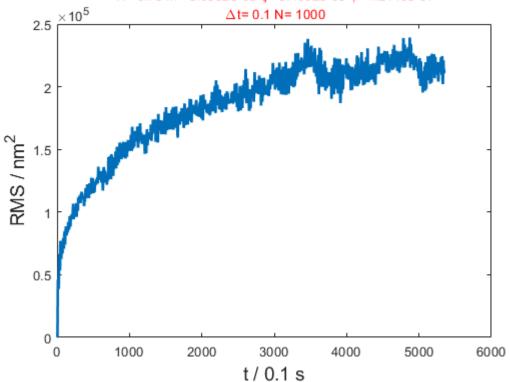
RMS-t H= 0.75 m= 5.0582e-09 ζ = 2.5959e-08 ψ =4.2418e-07 Δ t= 0.1 N= 1000



trying i_m=4, trying i_\psi=4, trying i_\zeta=3, total sampling number=5

progress rate 10 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 5.0582e-09 ζ = 3.4092e-08 ψ =4.2418e-07 Δt = 0.1 N= 1000



trying i_m=4, trying i_\psi=4, trying i_\zeta=4, total sampling number=5

progress rate 10 % progress rate 20 % 30 % progress rate progress rate 50 % progress rate progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 5.0582e-09 ζ= 4.4773e-08 ψ=4.2418e-07 Δt= 0.1 N= 1000

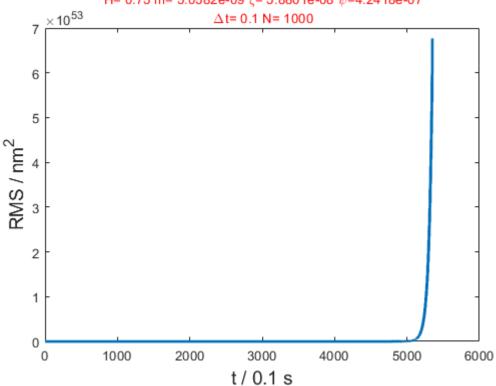
2.5 Δt= 0.1 N= 1000

1.5 Δt= 0.5 Δt= 0.1 N= 1000

t / 0.1 s

trying i_m=4, trying i_\psi=4, trying i_\zeta=5, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 5.0582e-09 ζ = 5.8801e-08 ψ =4.2418e-07 Δ t= 0.1 N= 1000



explosion!

trying i_m=4, trying i_\psi=5, trying i_\zeta=1, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 %

progress rate 50 % progress rate 60 % progress rate 70 %

progress rate 80 %
progress rate 90 %

progress rate 100 %

RMS-t H= 0.75 m= 5.0582e-09 ζ = 1.9766e-08 ψ =8.3843e-07 ×10⁵ Δt = 0.1 N= 1000 4 3.5 3 ZMS / nm² 1 0.5 0 3000 0 1000 2000 4000 5000 6000

```
trying i_m=4, trying i_\psi=5, trying i_\zeta=2, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %
```

RMS-t H= 0.75 m= 5.0582e-09 ζ= 2.5959e-08 ψ=8.3843e-07 Δt= 0.1 N= 1000 2.5 1.5 0.5

t / 0.1 s

trying i_m=4, trying i_\psi=5, trying i_\zeta=3, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 5.0582e-09 ζ = 3.4092e-08 ψ =8.3843e-07 2.5 × 10⁵ Δt = 0.1 N= 1000 2 RMS / nm² 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000

t / 0.1 s

trying i_m=4, trying i_\psi=5, trying i_\zeta=4, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 5.0582e-09 ζ = 4.4773e-08 ψ =8.3843e-07 2.5 × 10⁵ Δt = 0.1 N= 1000 2 RMS / nm² 1.5 0.5 0 3000 0 1000 2000 4000 5000 6000

t / 0.1 s

trying i_m=4, trying i_\psi=5, trying i_\zeta=5, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 5.0582e-09 ζ = 5.8801e-08 ψ =8.3843e-07 7 × 10⁵³ Δt = 0.1 N= 1000 RMS / nm²

t / 0.1 s

explosion! trying i_m=5, trying i_\psi=1, trying i_\zeta=1, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 6.792e-09 ζ = 1.9766e-08 ψ =5.4928e-08 ×10⁵ Δt = 0.1 N= 1000 4 3.5 3 2.5 km/s / nm² 2.5 cm 2 1 0.5 0 3000 0 1000 2000 4000 5000 6000

t / 0.1 s

trying i_m=5, trying i_\psi=1, trying i_\zeta=2, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 6.792e-09 ζ = 2.5959e-08 ψ =5.4928e-08 ×10⁵ Δt = 0.1 N= 1000 3 2.5 2 RMS / nm² 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000 t / 0.1 s

trying i_m=5, trying i_\psi=1, trying i_\zeta=3, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 6.792e-09 ζ = 3.4092e-08 ψ =5.4928e-08 2.5 × 10⁵ Δt = 0.1 N= 1000 2 RMS / nm² 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000

t / 0.1 s

trying i_m=5, trying i_\psi=1, trying i_\zeta=4, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 6.792e-09 ζ = 4.4773e-08 ψ =5.4928e-08 2 × 10⁵ Δt = 0.1 N= 1000 1.8 1.6 1.4 RMS / nm^2 1.2 1 0.8 0.6 0.4 0.2 0 3000 0 1000 2000 4000 5000 6000

t / 0.1 s

trying i_m=5, trying i_\psi=1, trying i_\zeta=5, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 6.792e-09 ζ = 5.8801e-08 ψ =5.4928e-08 ×10⁴ Δt = 0.1 N= 1000 RMS / nm^2

```
trying i_m=5, trying i_\psi=2, trying i_\zeta=1, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %
```

RMS-t H= 0.75 m= 6.792e-09 ζ = 1.9766e-08 ψ =1.0857e-07 ×10⁵ Δt = 0.1 N= 1000 4 3.5 3 1 0.5 0 3000 0 1000 2000 4000 5000 6000 t / 0.1 s

```
trying i_m=5, trying i_\psi=2, trying i_\zeta=2, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %
```

RMS-t H= 0.75 m= 6.792e-09 ζ = 2.5959e-08 ψ =1.0857e-07 ×10⁵ Δt = 0.1 N= 1000 3 2.5 2 RMS / nm² 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000 t / 0.1 s

trying i_m=5, trying i_\psi=2, trying i_\zeta=3, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 6.792e-09 ζ = 3.4092e-08 ψ =1.0857e-07 2.5 × 10⁵ Δt = 0.1 N= 1000 2 RMS / nm² 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000 t / 0.1 s

trying i_m=5, trying i_\psi=2, trying i_\zeta=4, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 6.792e-09 ζ = 4.4773e-08 ψ =1.0857e-07 ×10⁵ Δt = 0.1 N= 1000 2 1.8 1.6 1.4 RMS / nm^2 1.2 1 0.8 0.6 0.4 0.2 0 3000 0 1000 2000 4000 5000 6000 t / 0.1 s

trying i_m=5, trying i_\psi=2, trying i_\zeta=5, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 6.792e-09 ζ = 5.8801e-08 ψ =1.0857e-07 ×10⁴ Δt = 0.1 N= 1000 RMS / nm^2 t / 0.1 s

```
trying i_m=5, trying i_\psi=3, trying i_\zeta=1, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %
```

RMS-t H= 0.75 m= 6.792e-09 ζ = 1.9766e-08 ψ =2.146e-07 ×10⁵ Δt = 0.1 N= 1000 4 3.5 3 ZMS / nm² 1 0.5 0 3000 0 1000 2000 4000 6000 5000 t / 0.1 s

trying i_m=5, trying i_\psi=3, trying i_\zeta=2, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 6.792e-09 ζ = 2.5959e-08 ψ =2.146e-07 ×10⁵ Δt = 0.1 N= 1000 3 2.5 2 RMS / nm² 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000 t / 0.1 s

trying i_m=5, trying i_\psi=3, trying i_\zeta=3, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 6.792e-09 ζ = 3.4092e-08 ψ =2.146e-07 2.5 × 10⁵ Δt = 0.1 N= 1000 2 RMS / nm² 1.5 0.5 0 3000 0 1000 2000 4000 5000 6000 t / 0.1 s

trying i_m=5, trying i_\psi=3, trying i_\zeta=4, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 6.792e-09 ζ = 4.4773e-08 ψ =2.146e-07 ×10⁴ Δt = 0.1 N= 1000 RMS / nm^2

t / 0.1 s

RMS-t H= 0.75 m= 6.792e-09 ζ = 5.8801e-08 ψ =2.146e-07 $\times 10^4$ Δt = 0.1 N= 1000 RMS / nm^2

trying i_m=5, trying i_\psi=4, trying i_\zeta=1, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 6.792e-09 ζ = 1.9766e-08 ψ =4.2418e-07 3.5 × 10⁵ Δt = 0.1 N= 1000 3 2.5 RMS / nm^2 2 1.5 1 0.5 0 3000 0 1000 2000 4000 6000 5000

```
trying i_m=5, trying i_\psi=4, trying i_\zeta=2, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %
```

RMS-t H= 0.75 m= 6.792e-09 ζ = 2.5959e-08 ψ =4.2418e-07 ×10⁵ Δt = 0.1 N= 1000 3 2.5 2 RMS / nm² 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000

t / 0.1 s

trying i_m=5, trying i_\psi=4, trying i_\zeta=3, total sampling number=5 progress rate 10 % progress rate 20 % progress rate 30 % progress rate 40 % progress rate 50 % progress rate 60 % progress rate 70 % progress rate 80 % progress rate 90 % progress rate 100 %

RMS-t H= 0.75 m= 6.792e-09 ζ = 3.4092e-08 ψ =4.2418e-07 2.5 × 10⁵ Δt = 0.1 N= 1000 2 RMS / nm² 1.5 0.5 0 3000 0 1000 2000 4000 5000 6000

```
trying i_m=5, trying i_\psi=4, trying i_\zeta=4, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %
```

RMS-t H= 0.75 m= 6.792e-09 ζ = 4.4773e-08 ψ =4.2418e-07 ×10⁴ Δt = 0.1 N= 1000 RMS / nm^2

trying i_m=5, trying i_\psi=4, trying i_\zeta=5, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 6.792e-09 ζ = 5.8801e-08 ψ =4.2418e-07 ×10⁴ Δt = 0.1 N= 1000 RMS / nm^2

trying i_m=5, trying i_\psi=5, trying i_\zeta=1, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 6.792e-09 ζ = 1.9766e-08 ψ =8.3843e-07 ×10⁵ Δt = 0.1 N= 1000 4 THE STATE OF THE PARTY OF THE P 3.5 3 1 0.5 0 3000 0 1000 2000 4000 5000 6000 t / 0.1 s

trying i_m=5, trying i_\psi=5, trying i_\zeta=2, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 6.792e-09 ζ = 2.5959e-08 ψ =8.3843e-07 ×10⁵ Δt = 0.1 N= 1000 3 2.5 2 RMS / nm² 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000 t / 0.1 s

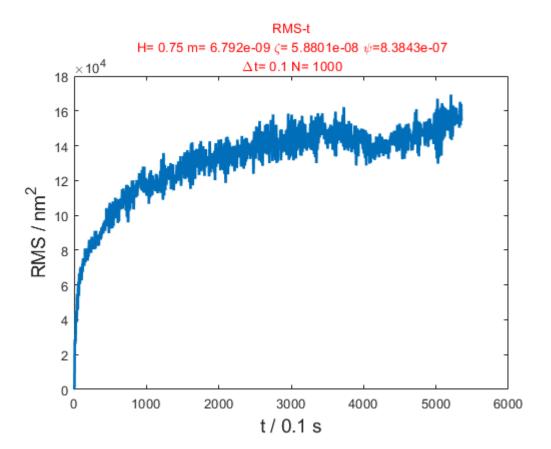
trying i_m=5, trying i_\psi=5, trying i_\zeta=3, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 6.792e-09 ζ = 3.4092e-08 ψ =8.3843e-07 2.5 × 10⁵ Δt = 0.1 N= 1000 2 RMS / nm² 1.5 1 0.5 0 3000 0 1000 2000 4000 5000 6000 t / 0.1 s

trying i_m=5, trying i_\psi=5, trying i_\zeta=4, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %

RMS-t H= 0.75 m= 6.792e-09 ζ = 4.4773e-08 ψ =8.3843e-07 ×10⁵ Δt = 0.1 N= 1000 2 1.8 1.6 1.4 ${\rm RMS\,/\,nm}^2$ 1.2 1 0.8 0.6 0.4 0.2 0 3000 0 1000 2000 4000 5000 6000

```
trying i_m=5, trying i_\psi=5, trying i_\zeta=5, total sampling number=5
progress rate 10 %
progress rate 20 %
progress rate 30 %
progress rate 40 %
progress rate 50 %
progress rate 60 %
progress rate 70 %
progress rate 80 %
progress rate 90 %
progress rate 100 %
```



index system: find the minimum of residuals and its lication.

```
%[mini,best_linear_location]=min(residual_compare,[],'all','linear');
%[best_m,best_psi_zeta]=find(residual_compare==mini);
%sampling_size=[sampling_frequency,sampling_frequency];
%[best_psi,best_zeta]=ind2sub(sampling_size,best_psi_zeta);
%good_parameter_location=find(residual_compare<=10*min(residual_compare,[],'all'));
%disp(['best m near ',num2str(sample_m(best_m))])
%disp(['best psi near ',num2str(sample_psi(best_psi))])
%disp(['best zeta near ',num2str(sample_zeta(best_zeta))])</pre>
```

saving

```
saving_loacation='C:\Users\dell\Desktop\zq\数据模拟\P.S.v3';
save([saving_loacation,'\data\parameterselection','m,psi,zeta',num2str(clock),'.mat'],'residua
```