

Import libraries

```
In [1]: # Python libraries
import os
import sys
import pandas as pd # for data manipulation
import numpy as np # for data manipulation
import tensorflow as tf
from sklearn.model_selection import train_test_split
from datetime import datetime
import time

# Plotting
import matplotlib.pyplot as plt

# To enable LaTeX and select a font
plt.rcParams.update({
    "text.usetex": True,
    "font.family": "sans-serif",
    "font.sans-serif": "Helvetica",
})

# Using ipynb import functions defined in other nb
sys.path.append("myfun/")
from ipynb.fs.defs.myfun_load_dataset import *
from ipynb.fs.full.myfun_nn import *
from ipynb.fs.defs.myfun_plot import *
```

2023-12-09 23:28:41.839725: I tensorflow/core/platform/cpu_feature_guard.cc:193] This TensorFlow binary is optimized with oneAPI Deep Neural Network Library (oneDNN) to use the following CPU instructions in performance-critical operations: SSE4.1 SSE4.2 AVX AVX2 FMA To enable them in other operations, rebuild TensorFlow with the appropriate compiler flags.

Tensorflow/Keras: 2.11.0
sklearn: 1.3.0

Data Acquisition

```
In [2]: # Load the dataset
par_dir = os.path.dirname(os.getcwd()) # parent dir
dir_name = par_dir + "/NN-interaction"
```

```
In [3]: processed_flag = 'pre'
# load the data
_, dflist = load_dataset(dir_name, processed_flag)
dataset = dflist

print(f"In this dataset we have {np.sum([d.shape[0] for d in dataset])}
```

In this dataset we have 671 scenes

Params

```
In [4]: DOE =[1,4,1] #Design of experiment  
  
v0 = 30  
NUM_ITER = 500  
LEARNING_RATE_v0 = 0.5  
test = 0.33  
  
plot_flag=True  
flag_save = True
```

NN: 1-4-1

```
In [5]: info_nn4, model_trained = solve_nn_dataset(dataset, DOE, v0, processes, test, plot_flag)
```

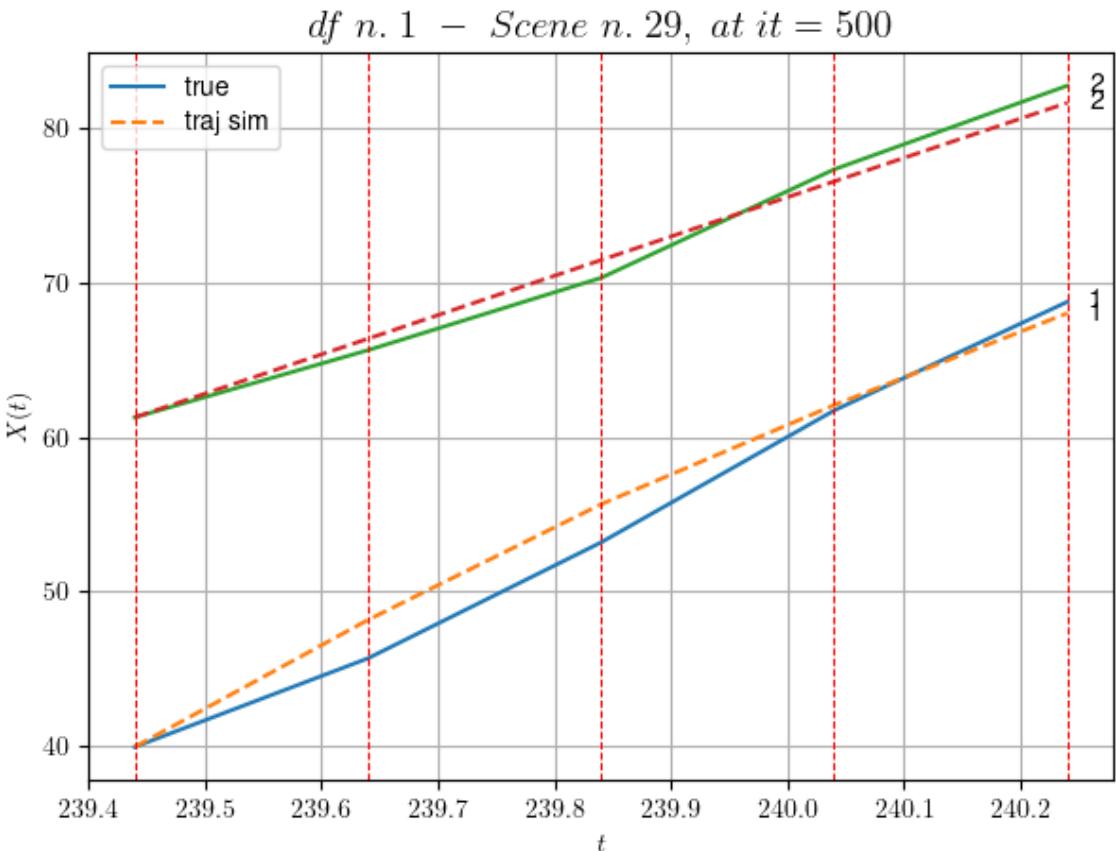
```
-----  
-----  
Analyzing 10 dfs. NN structure: 1-4-1  
*****  
*****
```

```
Analyzing 1/10 dfs.  
In DataFrame n.1 we have 109 scenes.  
To train the model we use 73 scenes, the remaining 36 to test the model.
```

```
Training step. (73 scenes)  
=====
```

```
DataFrame n.1. Scene n.1/73  
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```

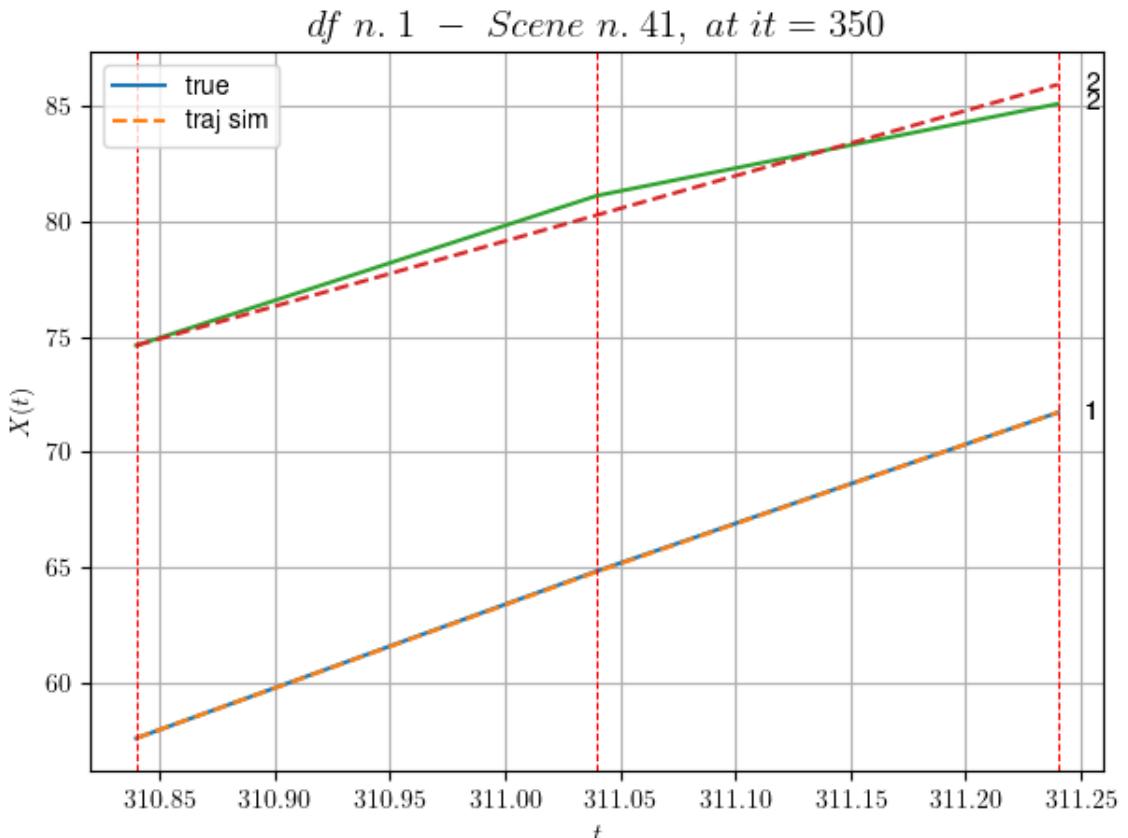
```
We have 4 time intervals inside [239.44,240.24]
```



```
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-----  
For scene 1/73:  
* After LR finder: LR_NN=5e-05 with mse=3.5075618320125694  
at it=24  
* v0 = 25.426381424530028  
* MSE = 1.5143691622144506  
* iterations = 500  
-----
```

DataFrame n.1. Scene n.2/73

We have 2 time intervals inside [310.84,311.24]



For scene 2/73:

* After LR finder: $LR_{NN}=0.0001$ with $mse=0.4207046436298876$

3 at it=24

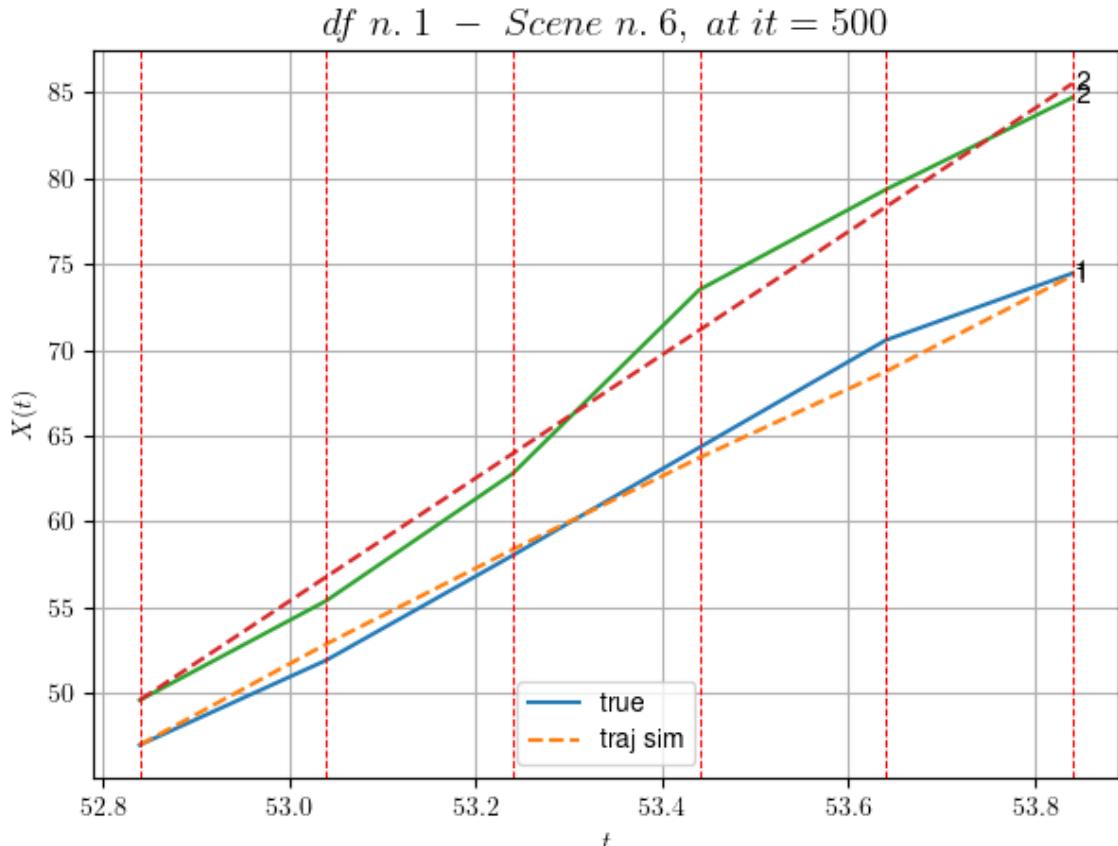
* $v_0 = 28.339874490955705$

* $MSE = 0.23574781118869412$

* iterations = 350

DataFrame n.1. Scene n.3/73

We have 5 time intervals inside [52.84,53.84]

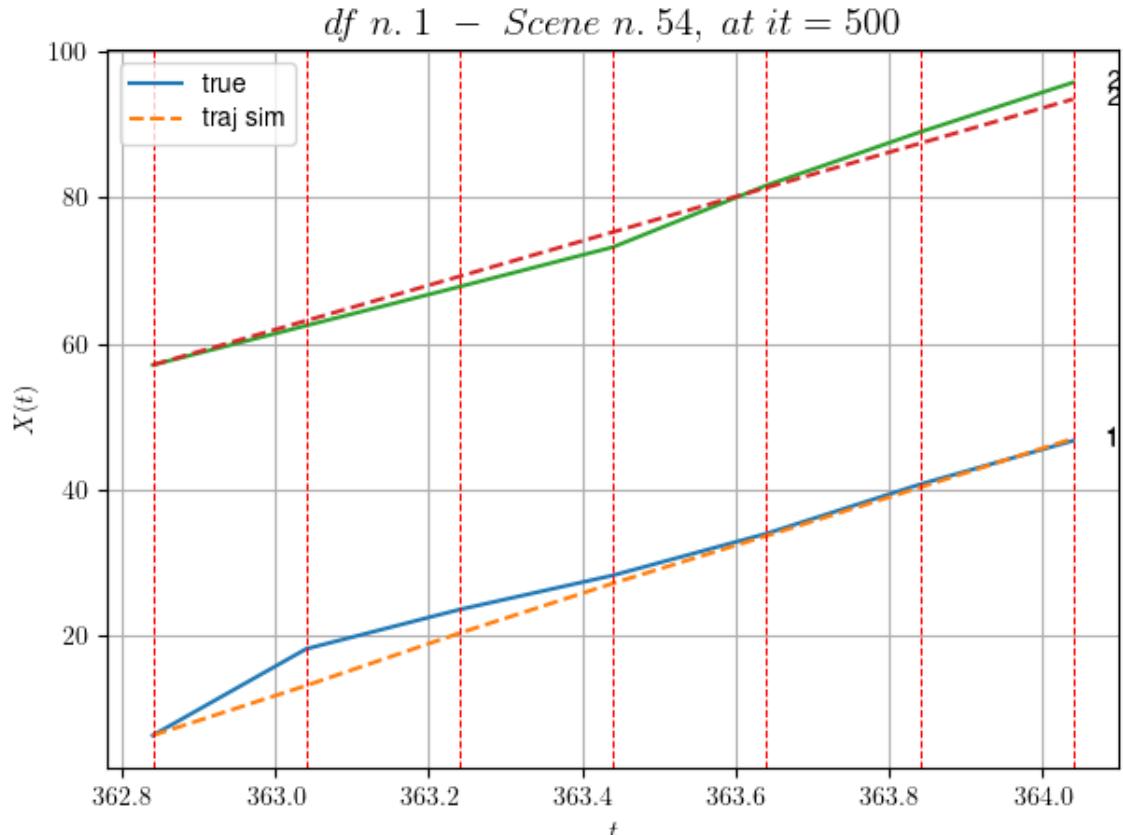


For scene 3/73:

* After LR finder: LR_NN=0.001 with mse=18.56864299688658 at it=24
* v0 = 35.9128223540259
* MSE = 1.2427098493907658
* iterations = 500

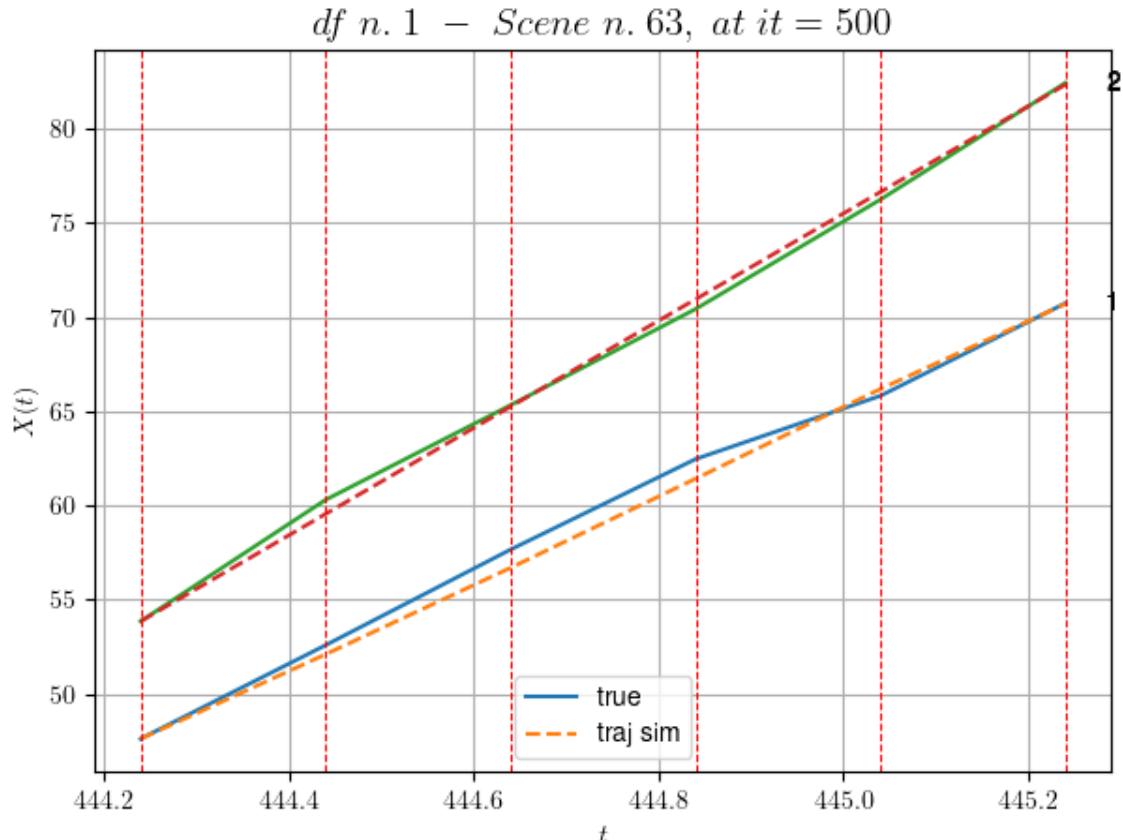
DataFrame n.1. Scene n.4/73

We have 6 time intervals inside [362.84,364.04]



DataFrame n.1. Scene n.5/73

We have 5 time intervals inside [444.24,445.24]

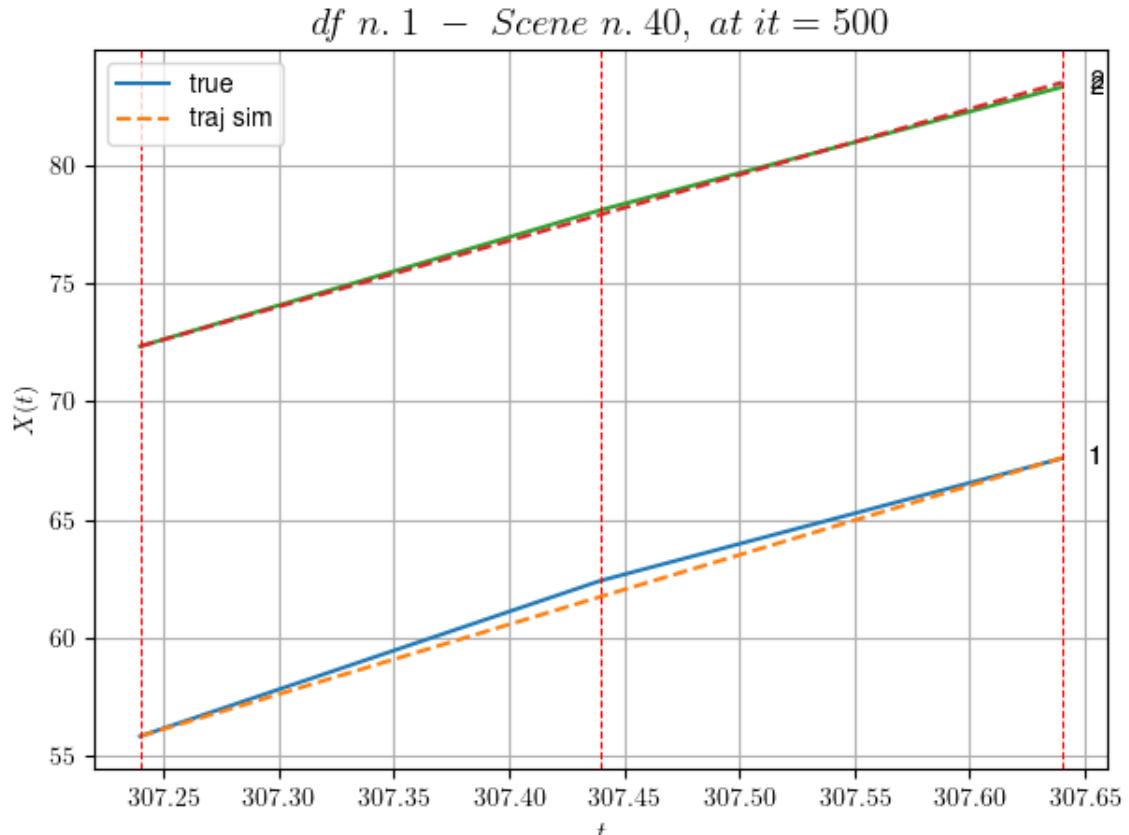


For scene 5/73:

* After LR finder: LR_NN=0.001 with mse=1.7222506194129774
at it=24
* v0 = 28.494973095575055
* MSE = 0.28352200784599024
* iterations = 500

DataFrame n.1. Scene n.6/73

We have 2 time intervals inside [307.24,307.64]

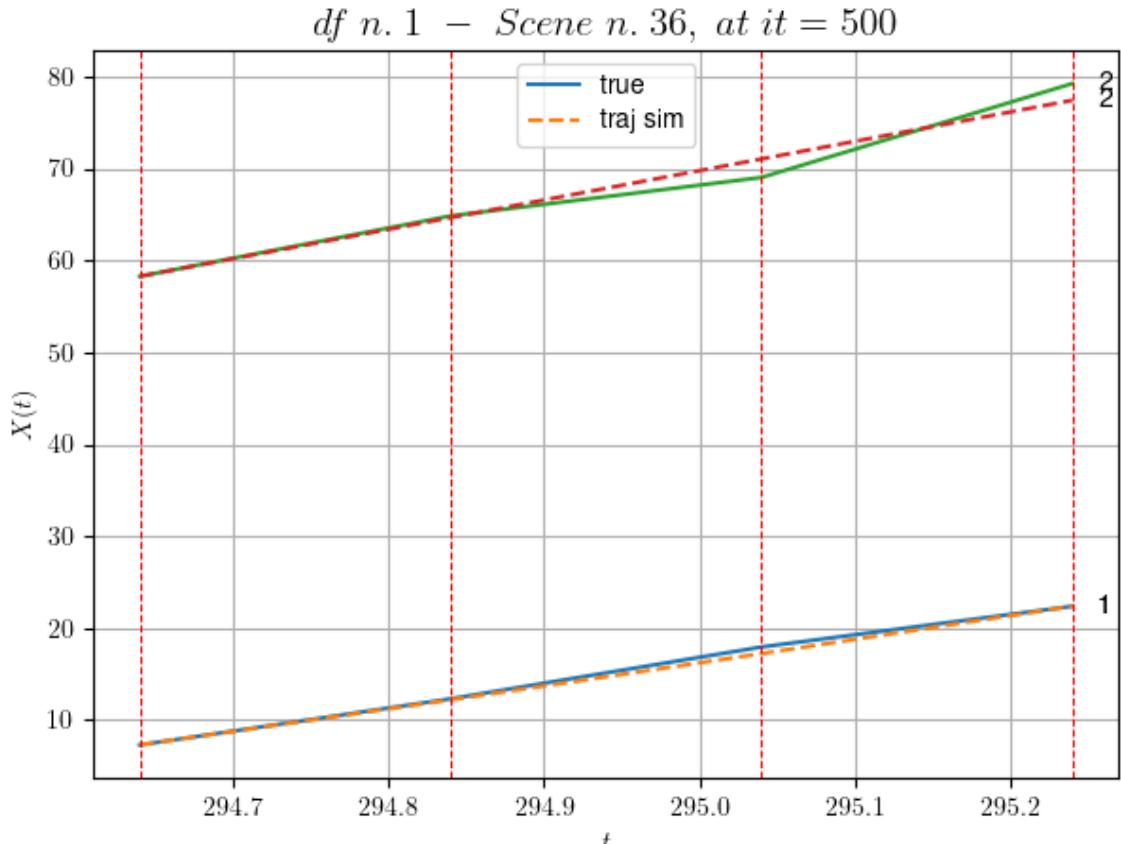


For scene 6/73:

* After LR finder: LR_NN=0.0001 with mse=0.2519091334896399
5 at it=24
* v0 = 27.87316406556698
* MSE = 0.08822086533747275
* iterations = 500

DataFrame n.1. Scene n.7/73

We have 3 time intervals inside [294.64, 295.24]

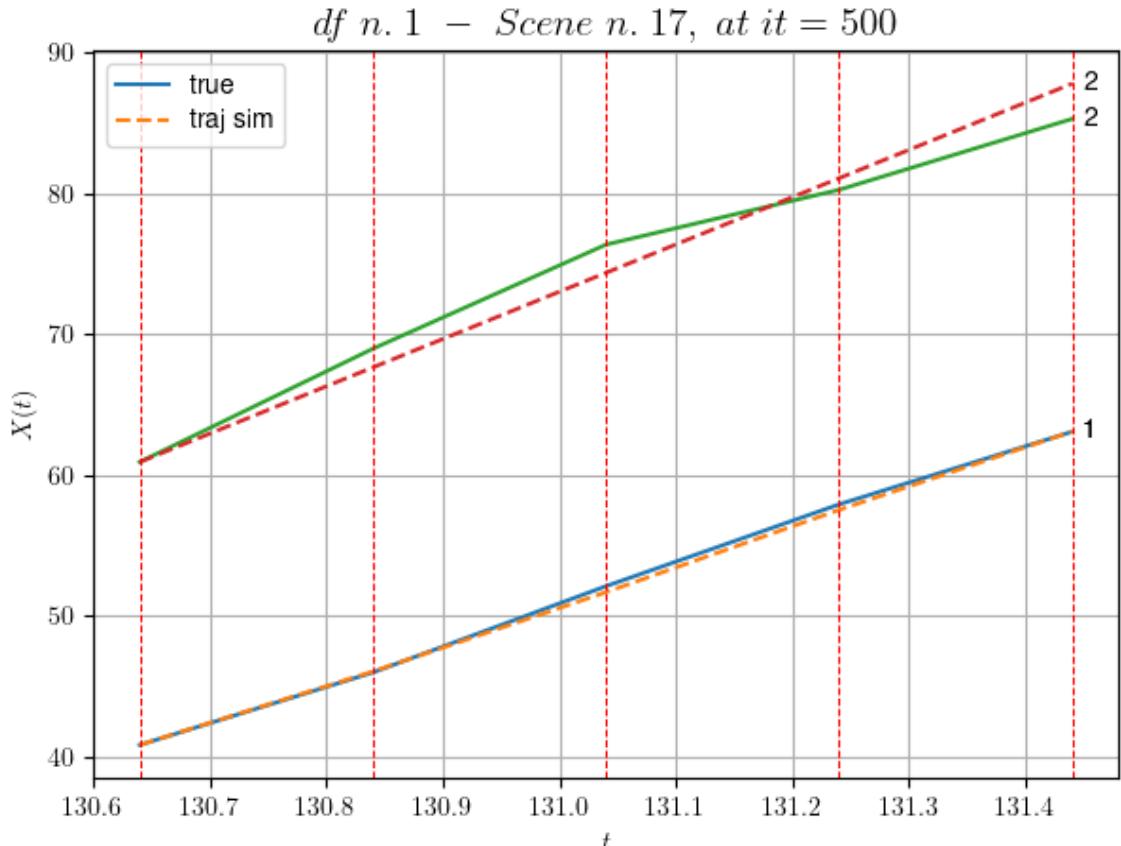


For scene 7/73:

* After LR finder: LR_NN=0.0001 with mse=1.4229833808681254
at it=24
* v0 = 31.912591419186118
* MSE = 0.9909070646124456
* iterations = 500

DataFrame n.1. Scene n.8/73

We have 4 time intervals inside [130.64,131.44]

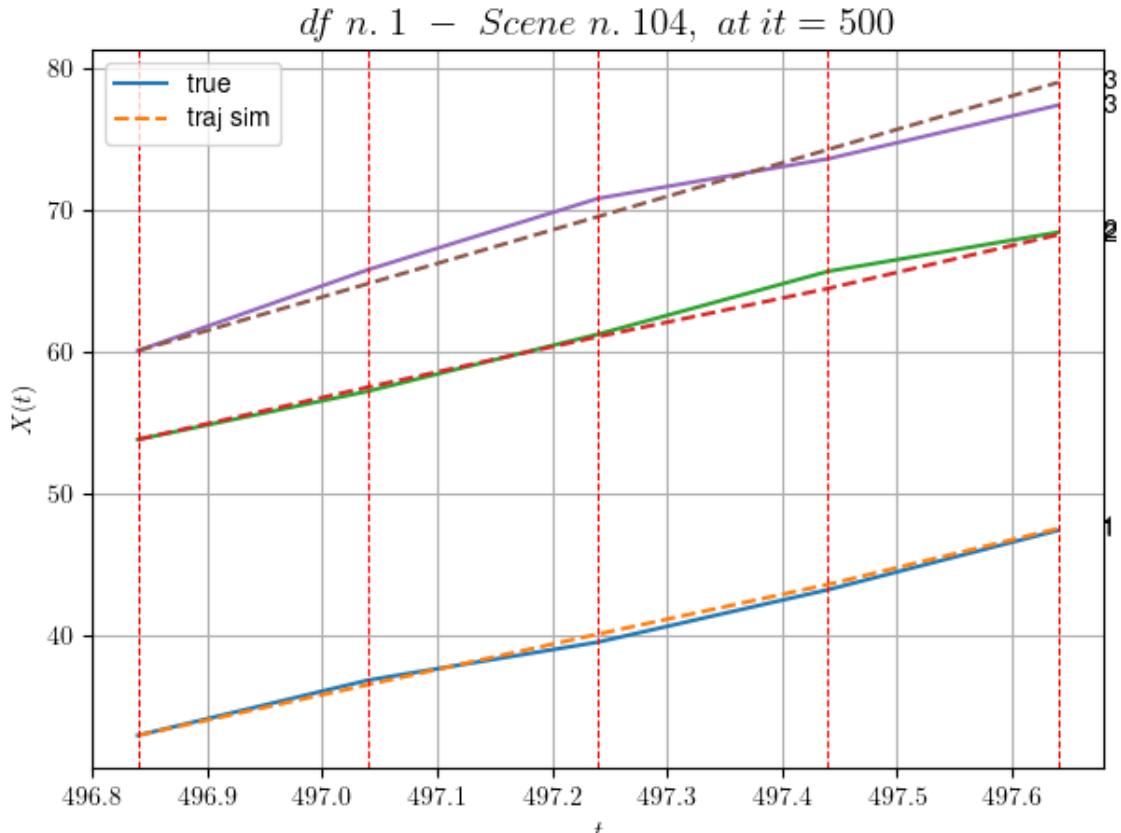


For scene 8/73:

* After LR finder: LR_NN=5e-05 with mse=1.8691983073439151
at it=24
* v0 = 33.61924590429469
* MSE = 1.140628577888577
* iterations = 500

DataFrame n.1. Scene n.9/73

We have 4 time intervals inside [496.84,497.64]

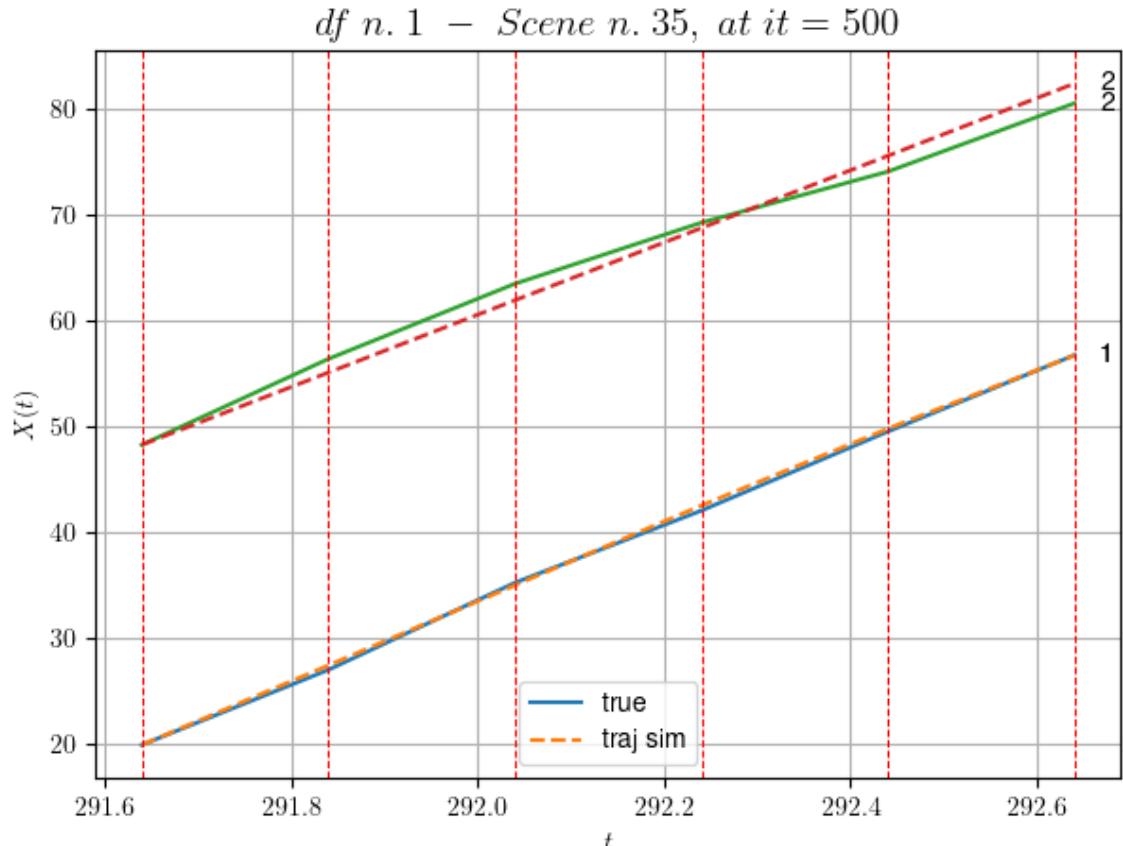


For scene 9/73:

* After LR finder: $LR_{NN}=0.001$ with $mse=12.762733958951637$
at it=24
* $v_0 = 23.671022130117823$
* MSE = 0.5169361280865296
* iterations = 500

DataFrame n.1. Scene n.10/73

We have 5 time intervals inside [291.64, 292.64]

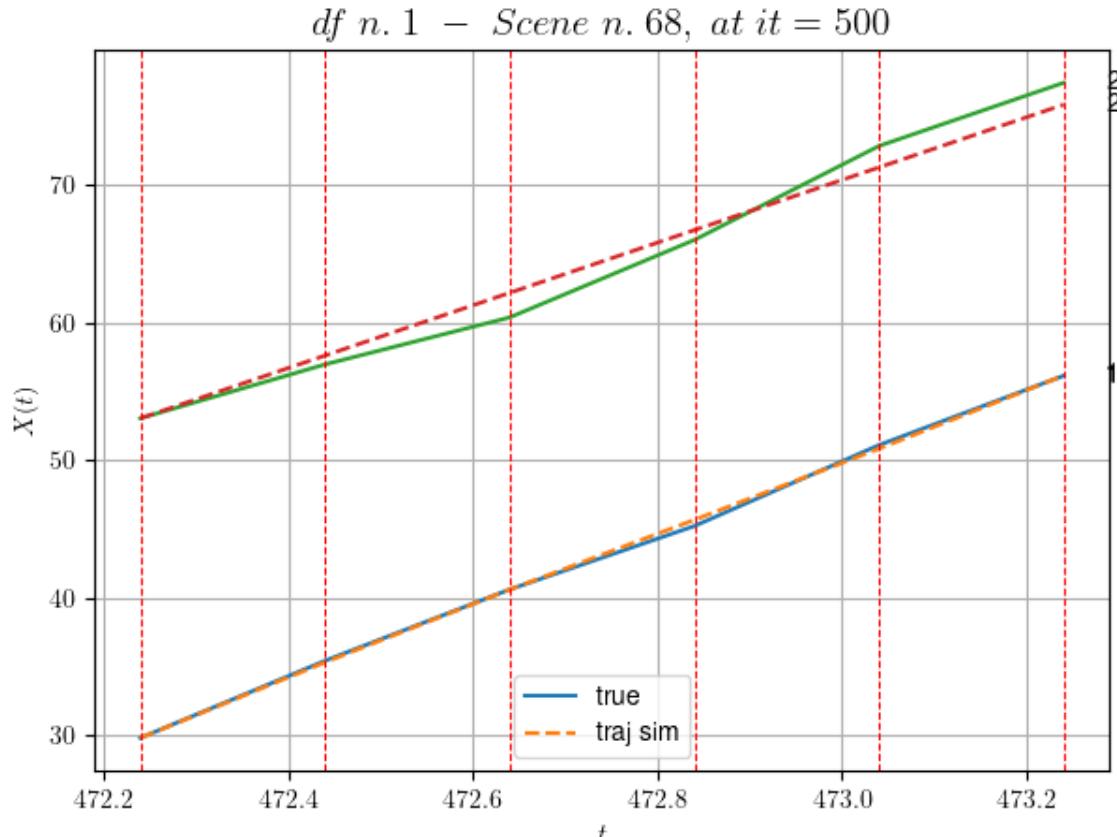


For scene 10/73:

* After LR finder: LR_NN=0.0001 with mse=2.8269643766161643
at it=24
* v0 = 34.119095688750704
* MSE = 0.7704520644130896
* iterations = 500

DataFrame n.1. Scene n.11/73

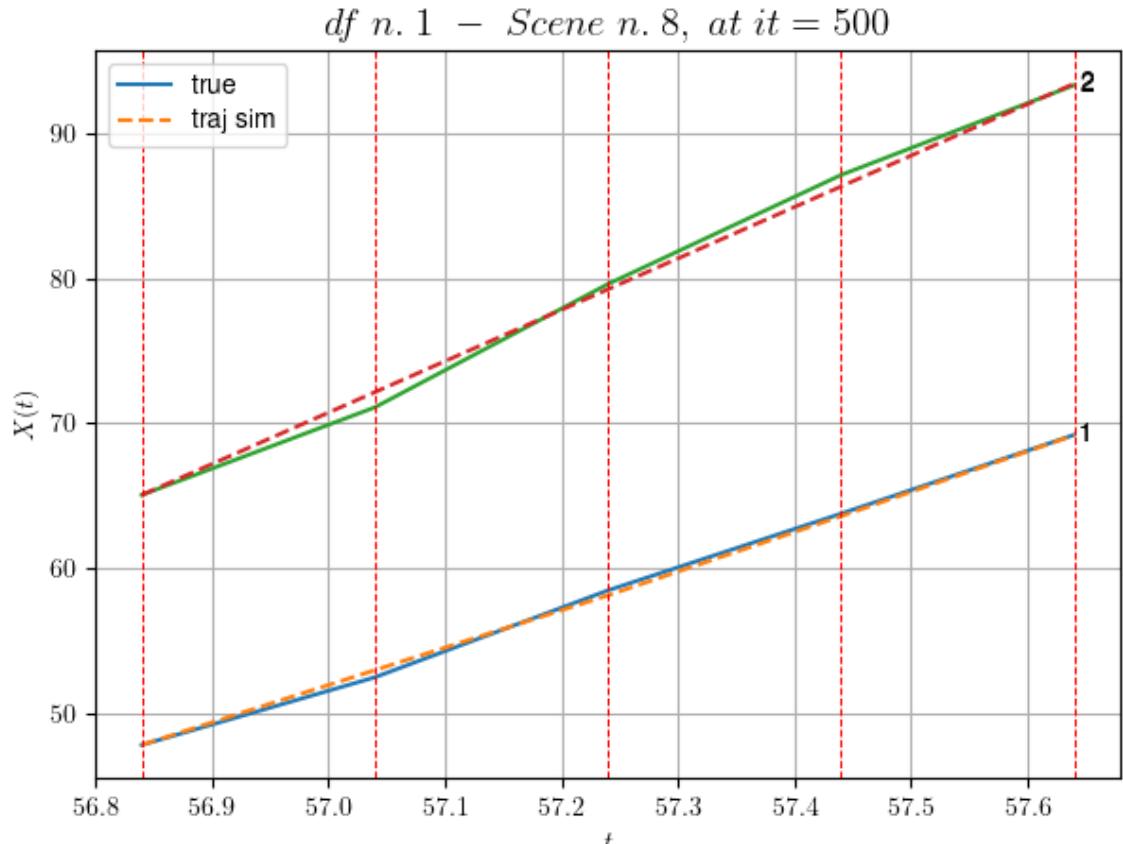
We have 5 time intervals inside [472.24,473.24]



For scene 11/73:
* After LR finder: LR_NN=5e-05 with mse=8.503640107850927 at it=24
* v0 = 22.76470215605674
* MSE = 0.6867516533400914
* iterations = 500

DataFrame n.1. Scene n.12/73

We have 4 time intervals inside [56.84,57.64]

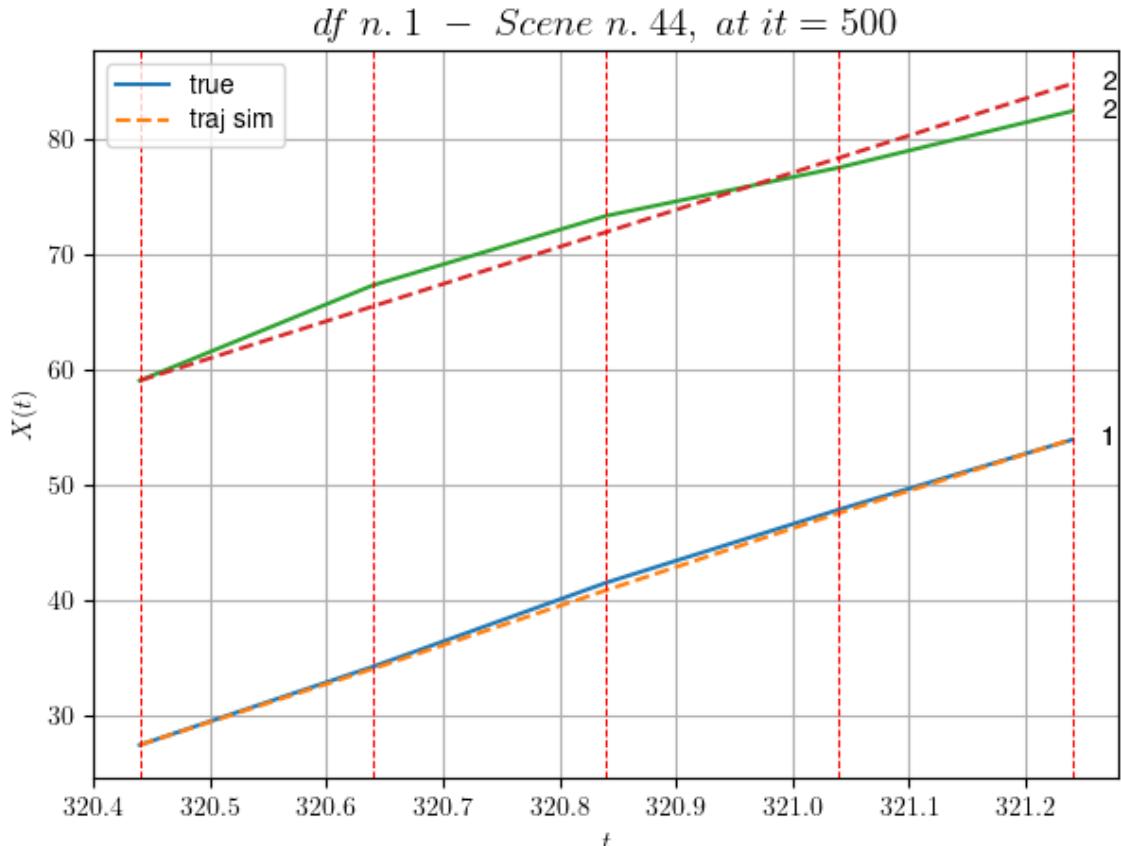


For scene 12/73:

* After LR finder: LR_NN=0.0001 with mse=4.526174665527746
at it=24
* v0 = 35.496956490177936
* MSE = 0.22606124401652905
* iterations = 500

DataFrame n.1. Scene n.13/73

We have 4 time intervals inside [320.44,321.24]

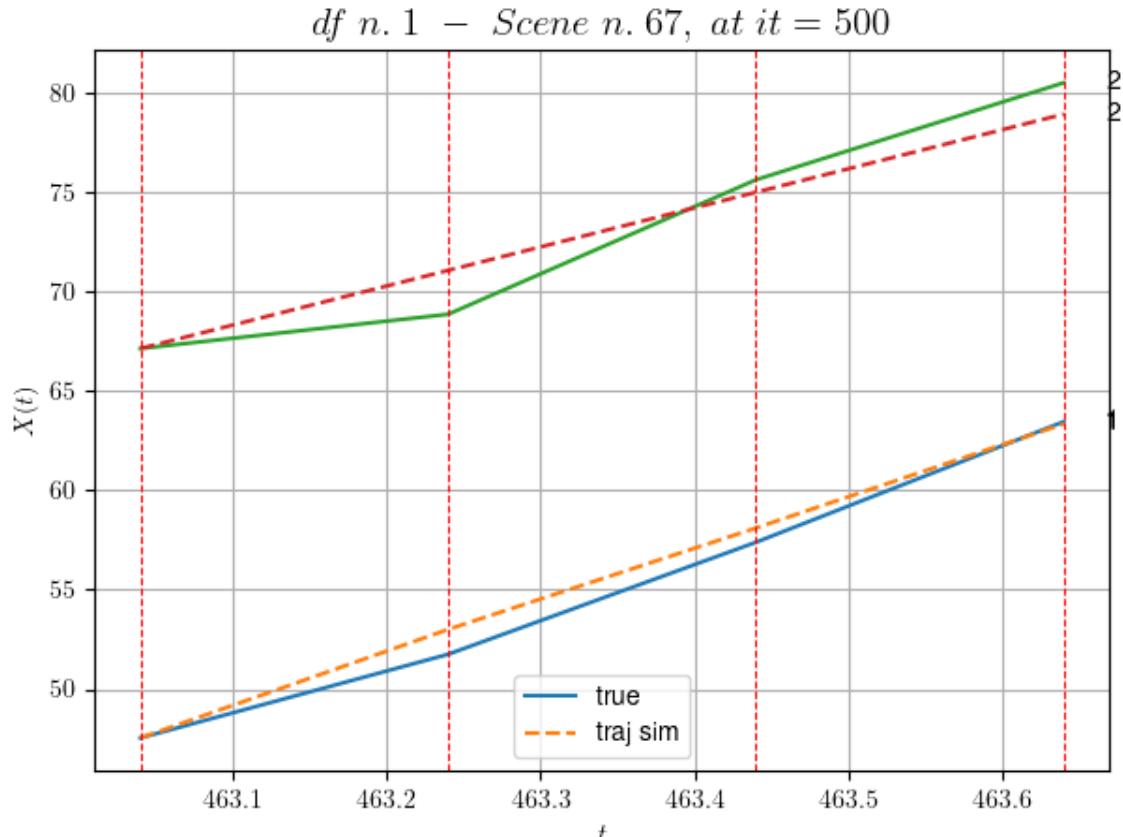


For scene 13/73:

* After LR finder: LR_NN=5e-05 with mse=1.1307353365227664
at it=24
* v0 = 32.19336724924344
* MSE = 1.0610553324179655
* iterations = 500

DataFrame n.1. Scene n.14/73

We have 3 time intervals inside [463.04,463.64]

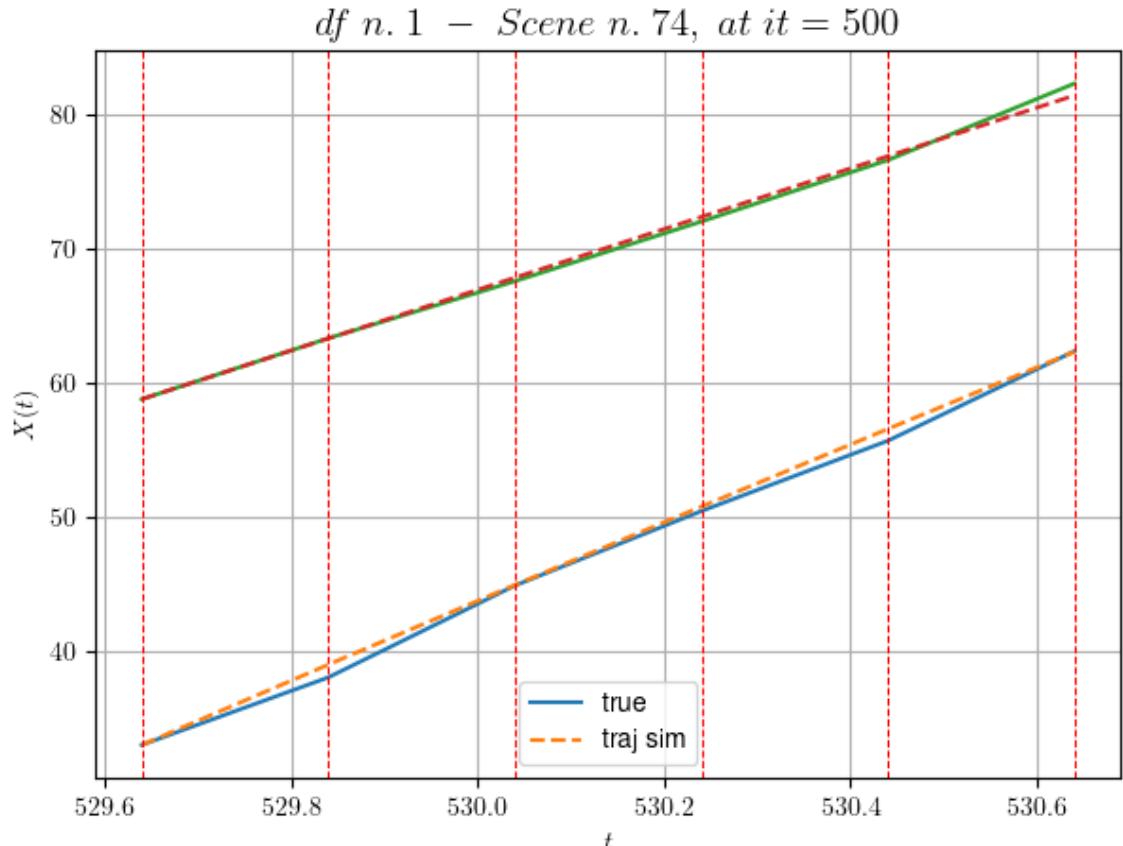


For scene 14/73:

* After LR finder: LR_NN=0.0001 with mse=6.862530732305238
at it=24
* $v_0 = 19.662006047654515$
* MSE = 1.137152884121646
* iterations = 500

DataFrame n.1. Scene n.15/73

We have 5 time intervals inside [529.64, 530.64]

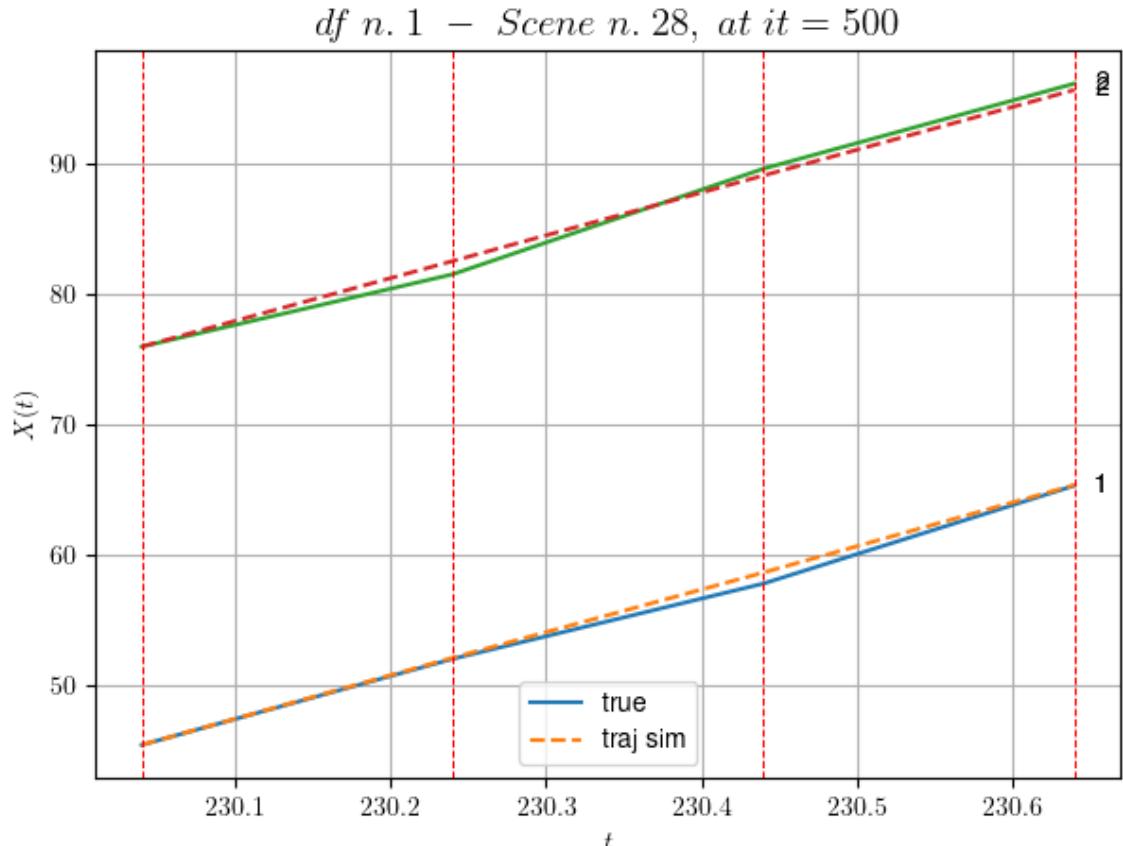


For scene 15/73:

* After LR finder: LR_NN=1e-05 with mse=9.986986531511569 at it=24
* v0 = 22.628998285034864
* MSE = 0.23674498181582102
* iterations = 500

DataFrame n.1. Scene n.16/73

We have 3 time intervals inside [230.04,230.64]

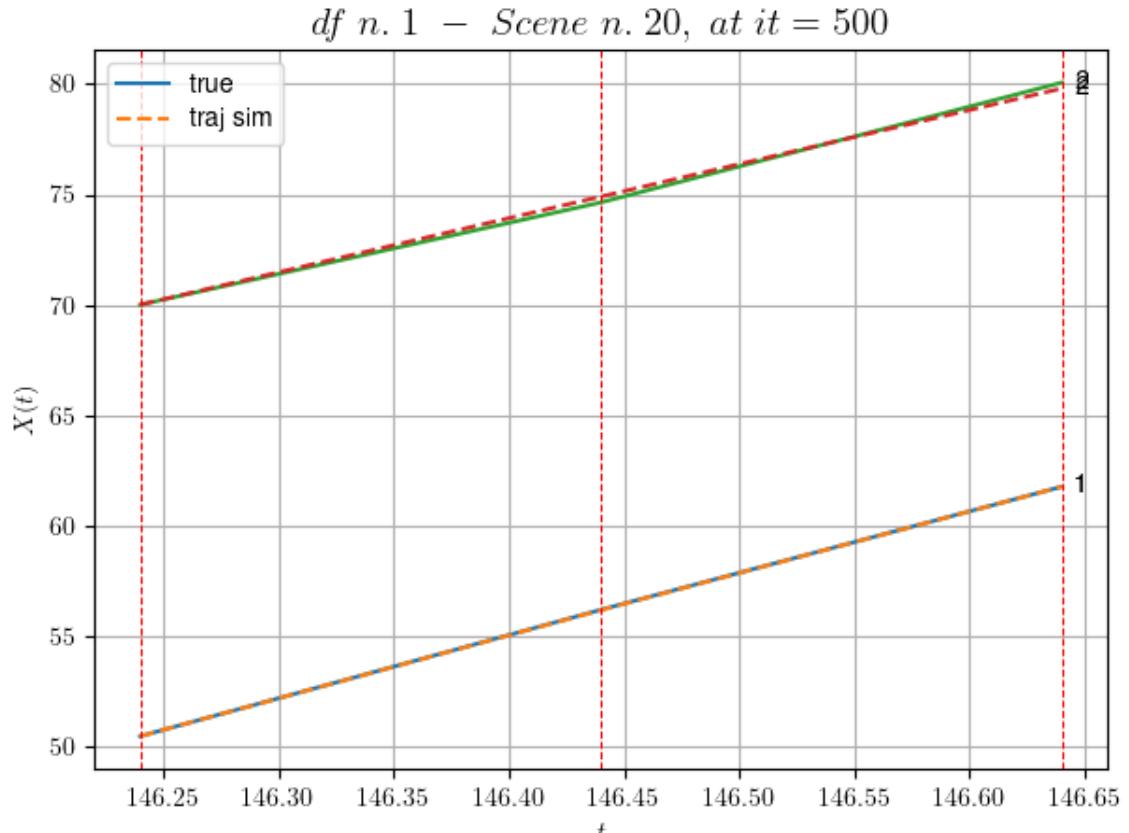


For scene 16/73:

* After LR finder: LR_NN=5e-05 with mse=1.0235102312363202
at it=24
* v0 = 32.80710231491782
* MSE = 0.28243968794791935
* iterations = 500

DataFrame n.1. Scene n.17/73

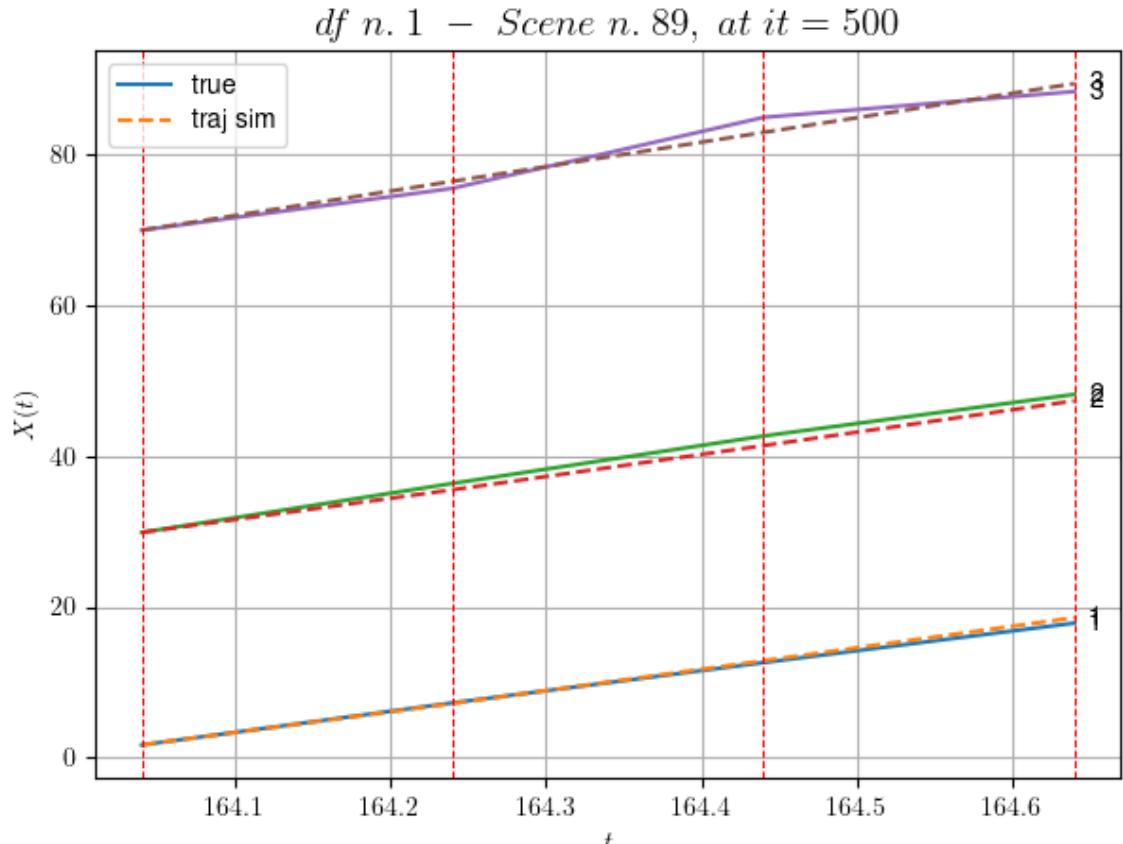
We have 2 time intervals inside [146.24,146.64]



For scene 17/73:
* After LR finder: LR_NN=0.0001 with mse=0.942960957608666
at it=24
* v0 = 24.481033300048576
* MSE = 0.02108317188304019
* iterations = 500

DataFrame n.1. Scene n.18/73

We have 3 time intervals inside [164.04,164.64]

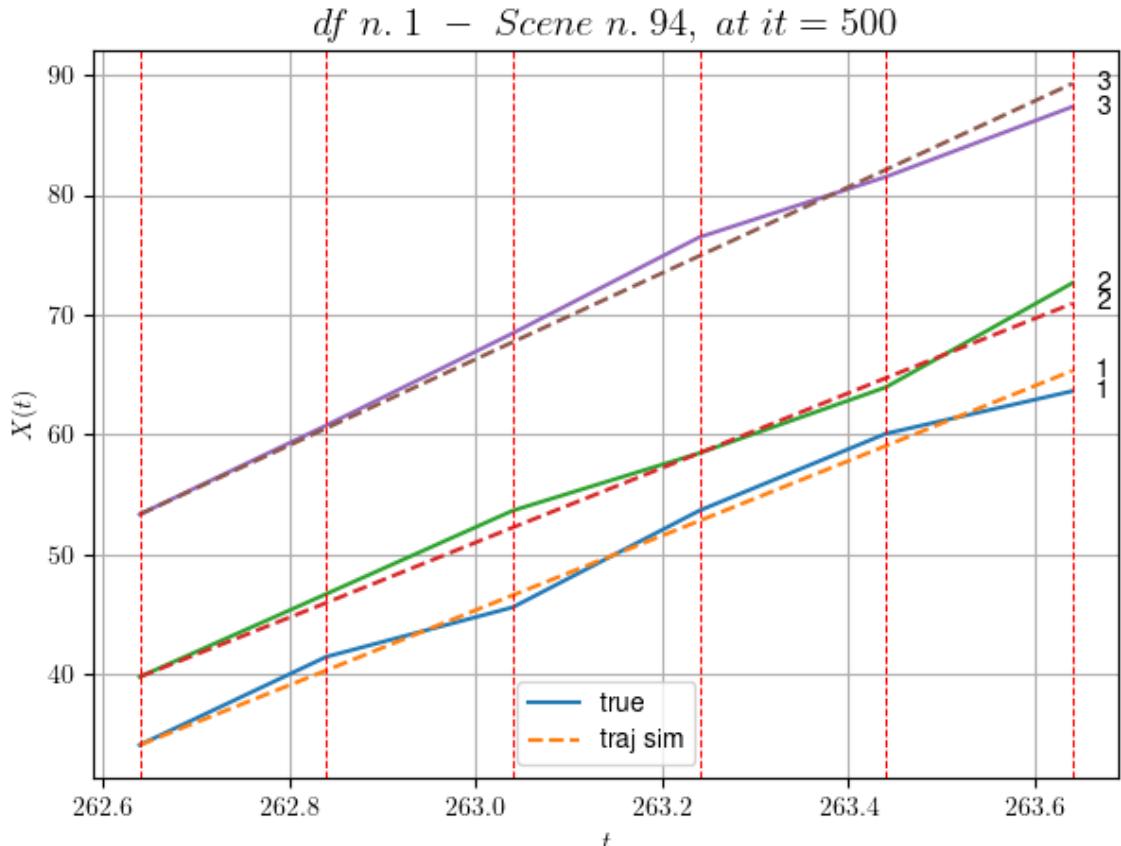


For scene 18/73:

* After LR finder: LR_NN=5e-05 with mse=1.6524954037000361
at it=24
* v0 = 32.43285094624315
* MSE = 0.6215587345979136
* iterations = 500

DataFrame n.1. Scene n.19/73

We have 5 time intervals inside [262.64,263.64]

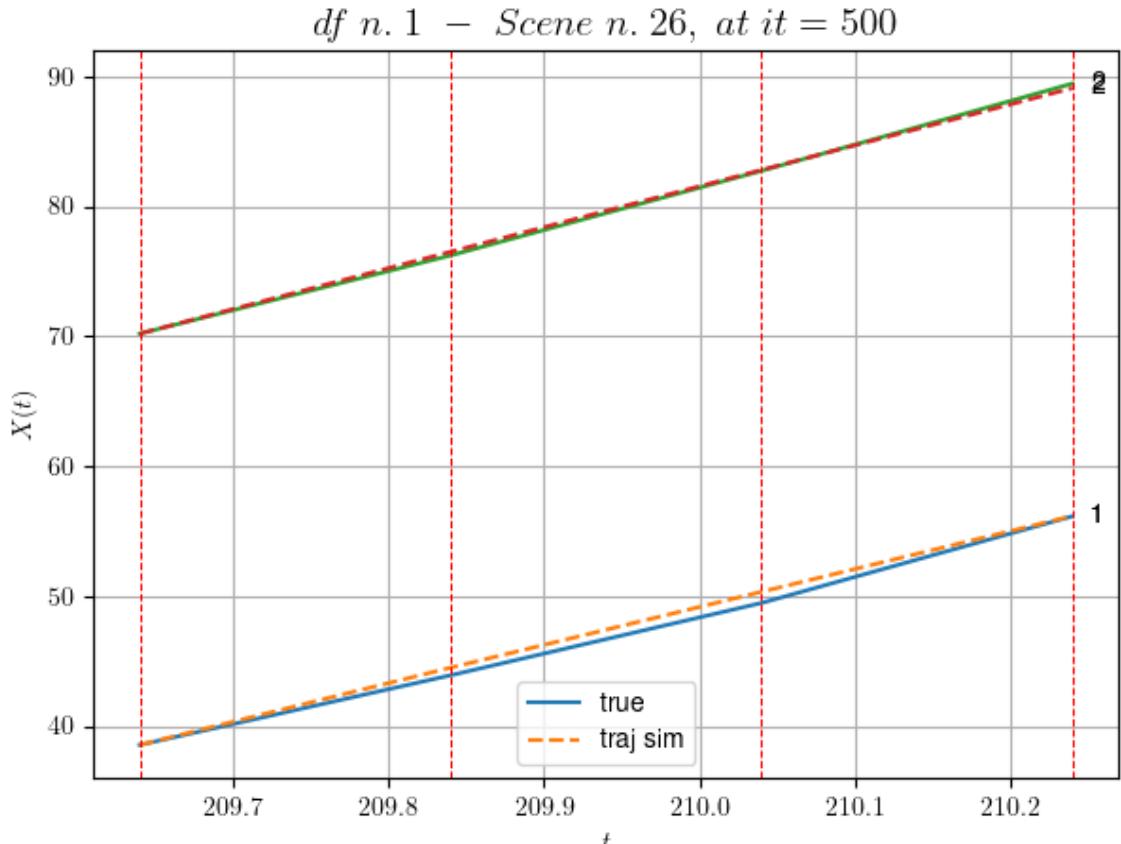


For scene 19/73:

* After LR finder: LR_NN=0.0001 with mse=40.81110635825598
at it=24
* v0 = 35.9310974274643
* MSE = 1.0631516511163142
* iterations = 500

DataFrame n.1. Scene n.20/73

We have 3 time intervals inside [209.64, 210.24]



For scene 20/73:

* After LR finder: LR_NN=0.0001 with mse=0.3623349786307582

5 at it=24

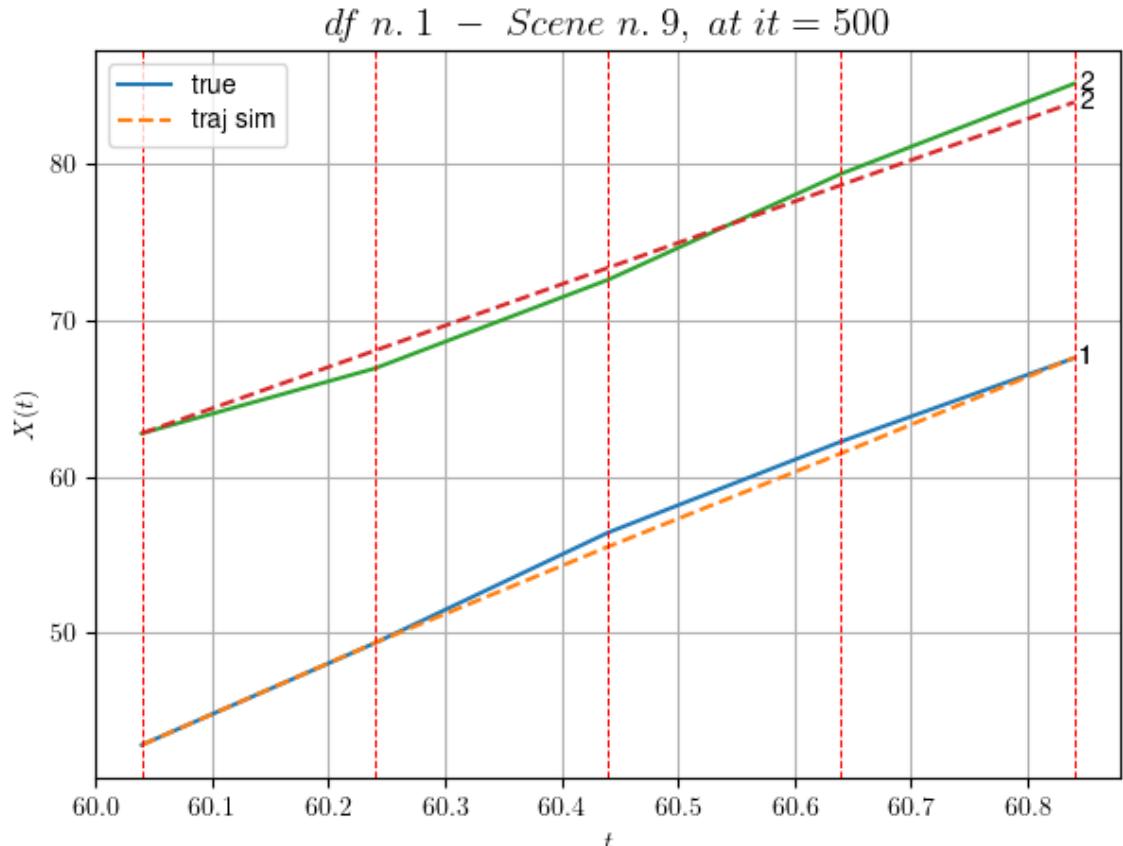
* v0 = 31.50707137223942

* MSE = 0.1608852837092678

* iterations = 500

DataFrame n.1. Scene n.21/73

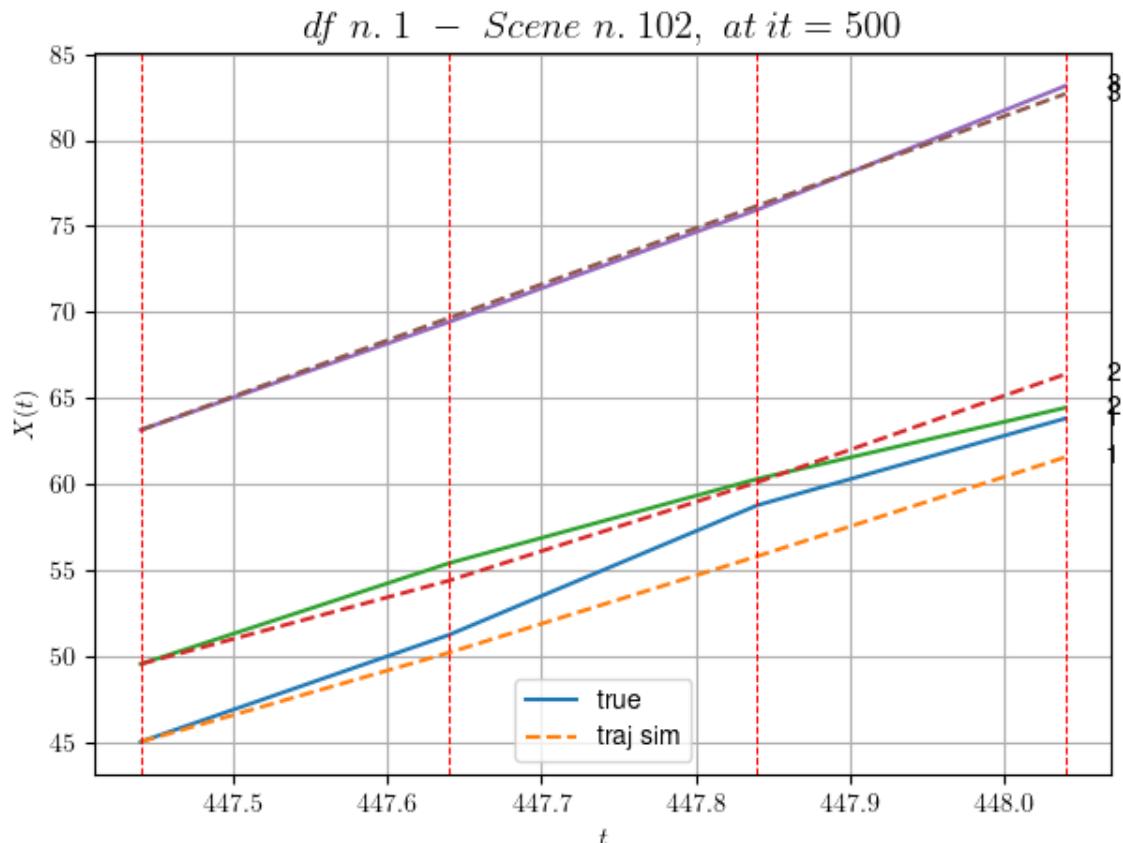
We have 4 time intervals inside [60.04,60.84]



For scene 21/73:
* After LR finder: LR_NN=5e-05 with mse=1.3558398655112707
at it=24
* v0 = 26.52161959108593
* MSE = 0.5030638163207455
* iterations = 500

DataFrame n.1. Scene n.22/73

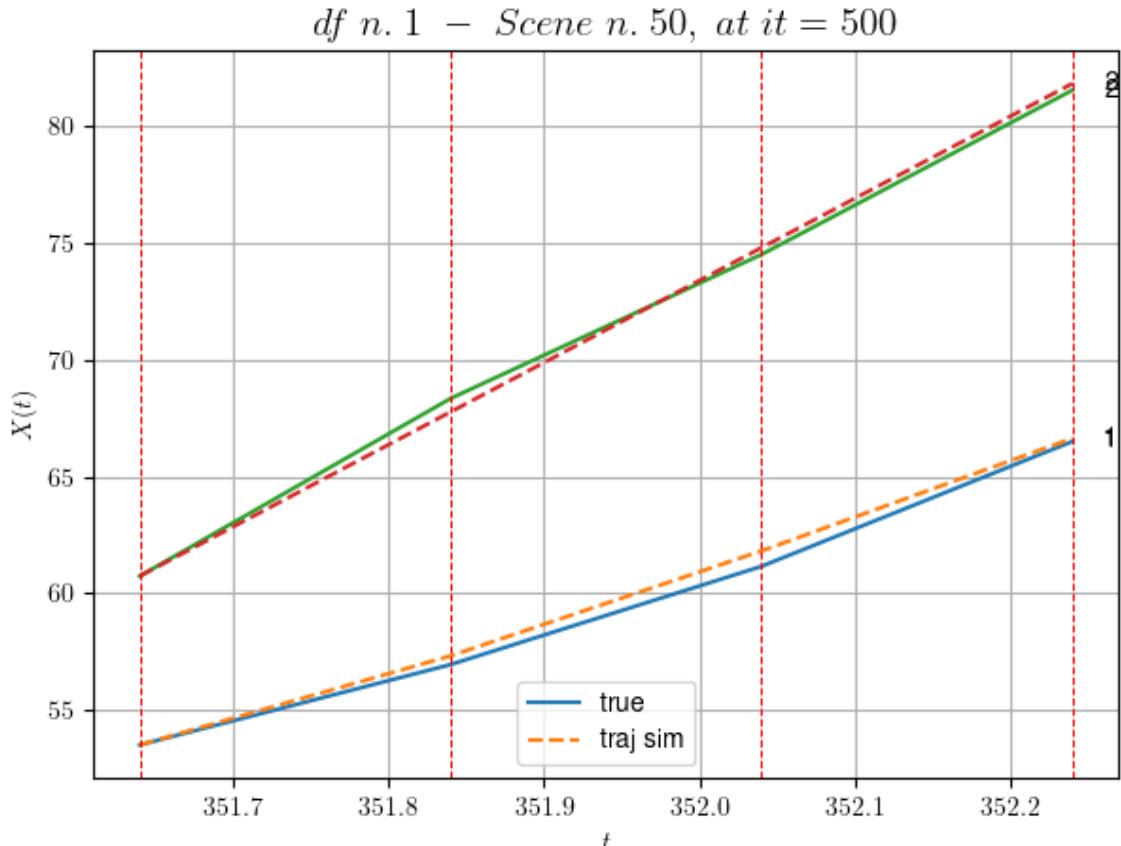
We have 3 time intervals inside [447.44,448.04]



For scene 22/73:
* After LR finder: LR_NN=0.001 with mse=24.281567155847693
at it=24
* $v_0 = 32.5848600451781$
* MSE = 1.6756074433861892
* iterations = 500

DataFrame n.1. Scene n.23/73

We have 3 time intervals inside [351.64, 352.24]

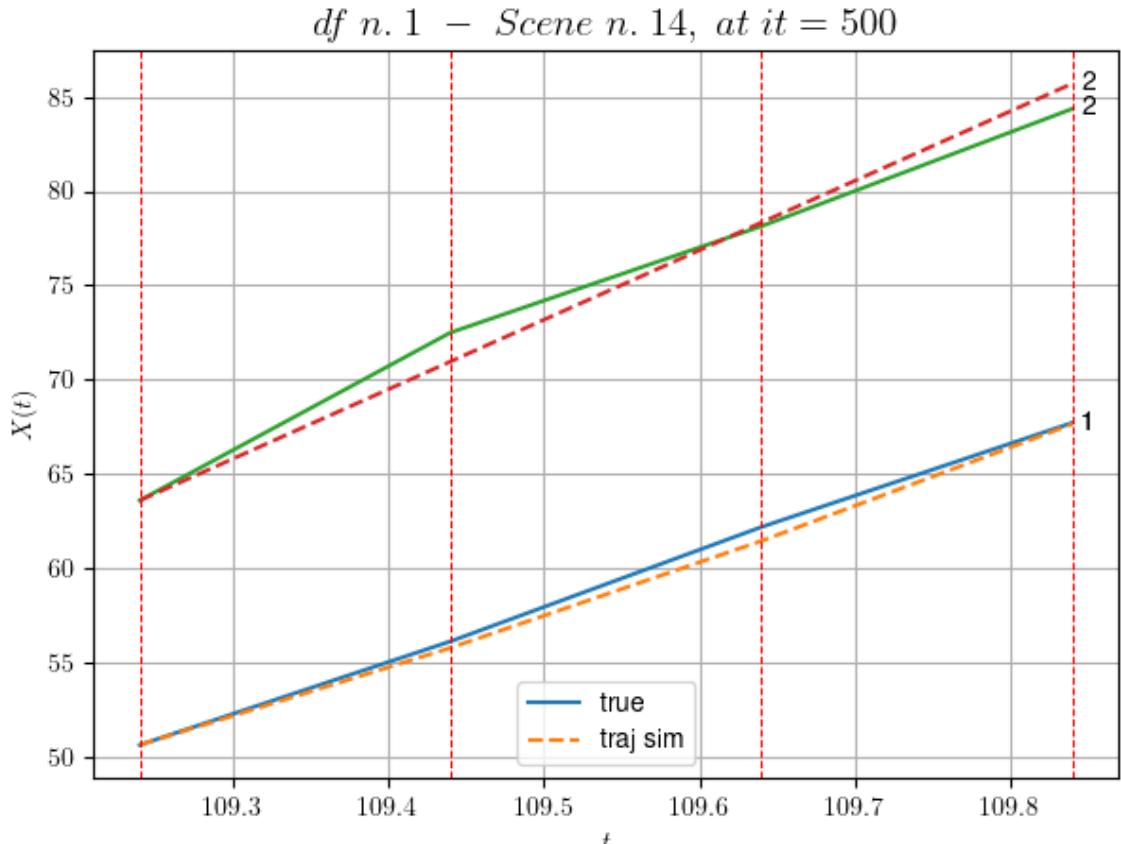


For scene 23/73:

* After LR finder: LR_NN=0.0001 with mse=1.7215534347571562
at it=24
* v0 = 35.128237730719775
* MSE = 0.1360976058719976
* iterations = 500

DataFrame n.1. Scene n.24/73

We have 3 time intervals inside [109.24,109.84]

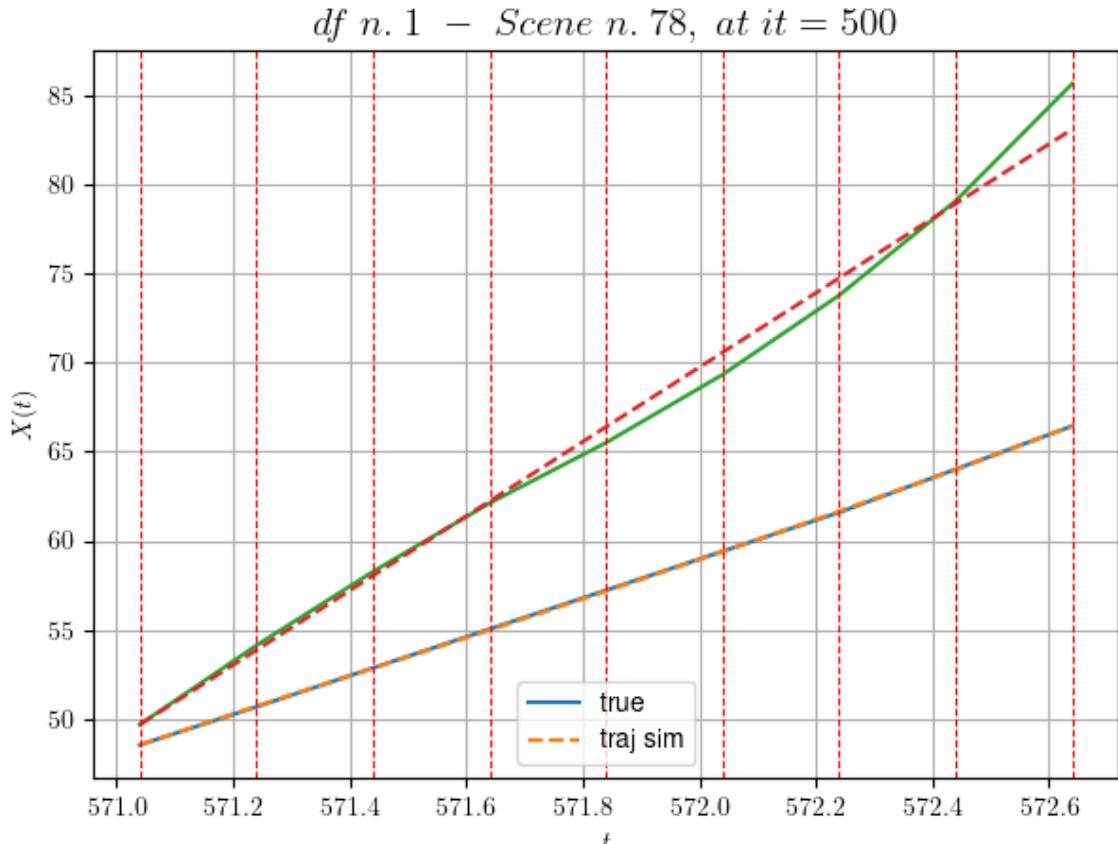


For scene 24/73:

* After LR finder: LR_NN=0.001 with mse=2.9270784156563825
at it=24
* $v_0 = 36.87036026795293$
* MSE = 0.5031900121041373
* iterations = 500

DataFrame n.1. Scene n.25/73

We have 8 time intervals inside [571.04,572.64]

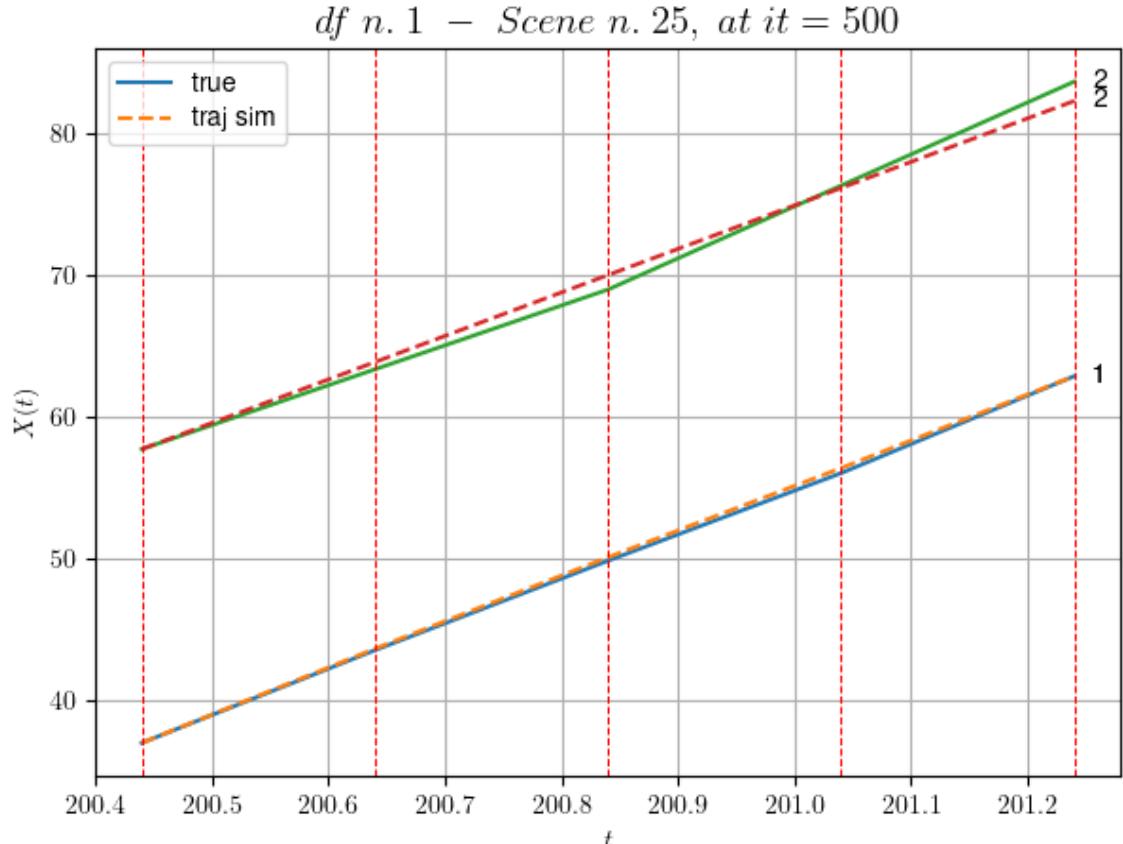


For scene 25/73:

* After LR finder: LR_NN=0.001 with mse=40.14620610816999 at it=24
* v0 = 20.877122500554435
* MSE = 0.5438820277599359
* iterations = 500

DataFrame n.1. Scene n.26/73

We have 4 time intervals inside [200.44,201.24]

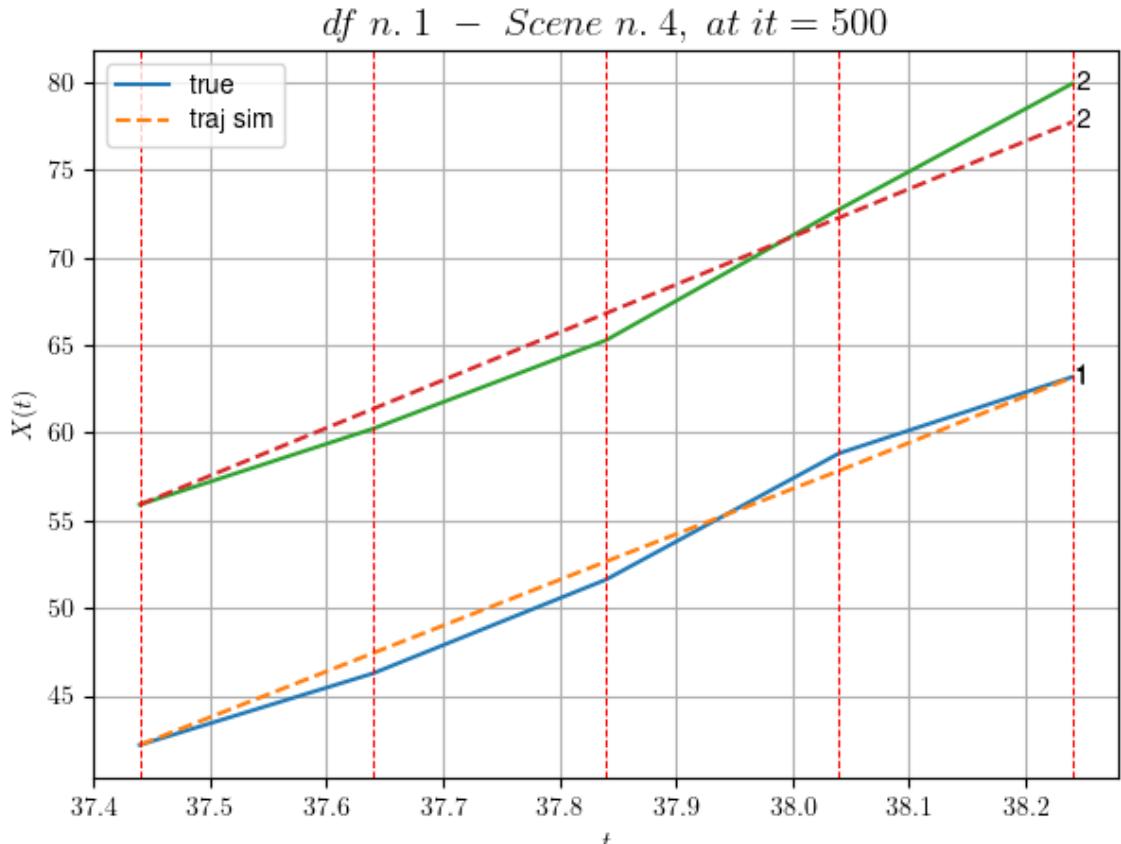


For scene 26/73:

* After LR finder: LR_NN=0.0001 with mse=0.5024512887426897
at it=24
* v0 = 30.7102738912185
* MSE = 0.33938952607739054
* iterations = 500

DataFrame n.1. Scene n.27/73

We have 4 time intervals inside [37.44,38.24]

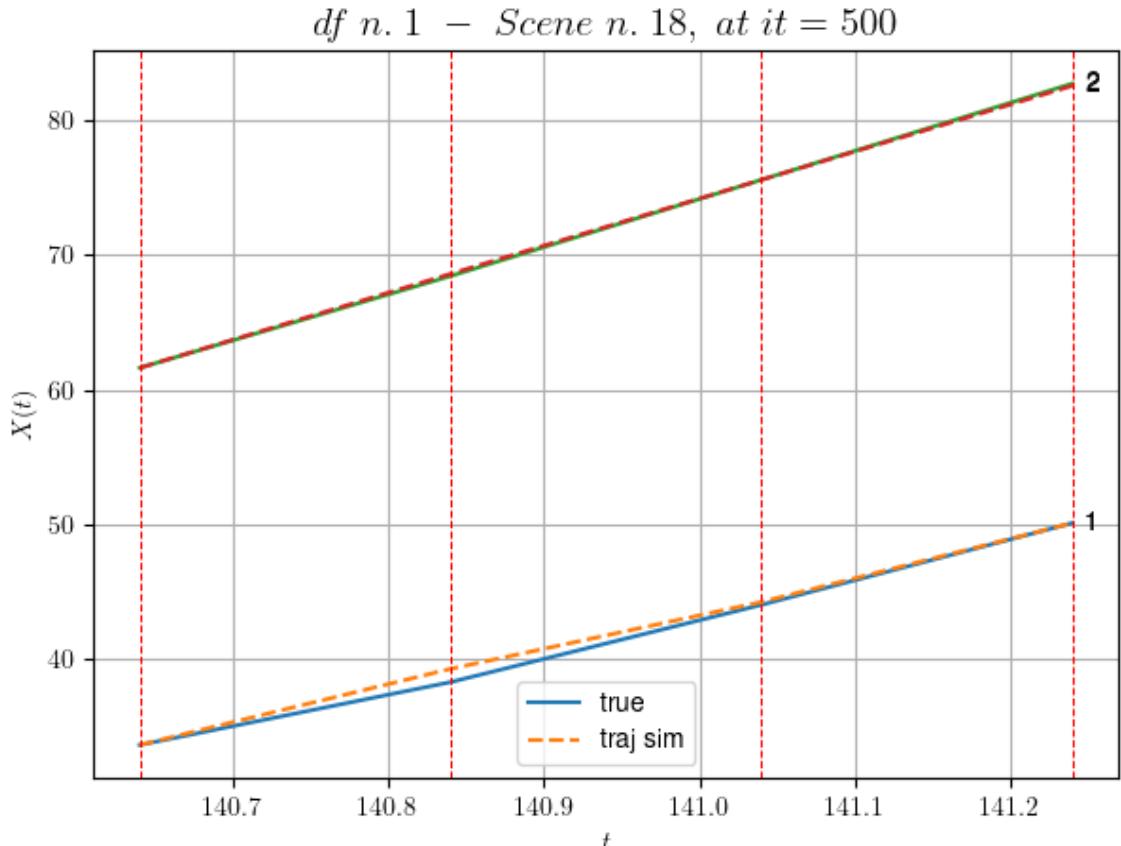


For scene 27/73:

* After LR finder: LR_NN=5e-05 with mse=1.4451470793059165
at it=24
* v0 = 27.29525416582093
* MSE = 1.0984231268709428
* iterations = 500

DataFrame n.1. Scene n.28/73

We have 3 time intervals inside [140.64,141.24]

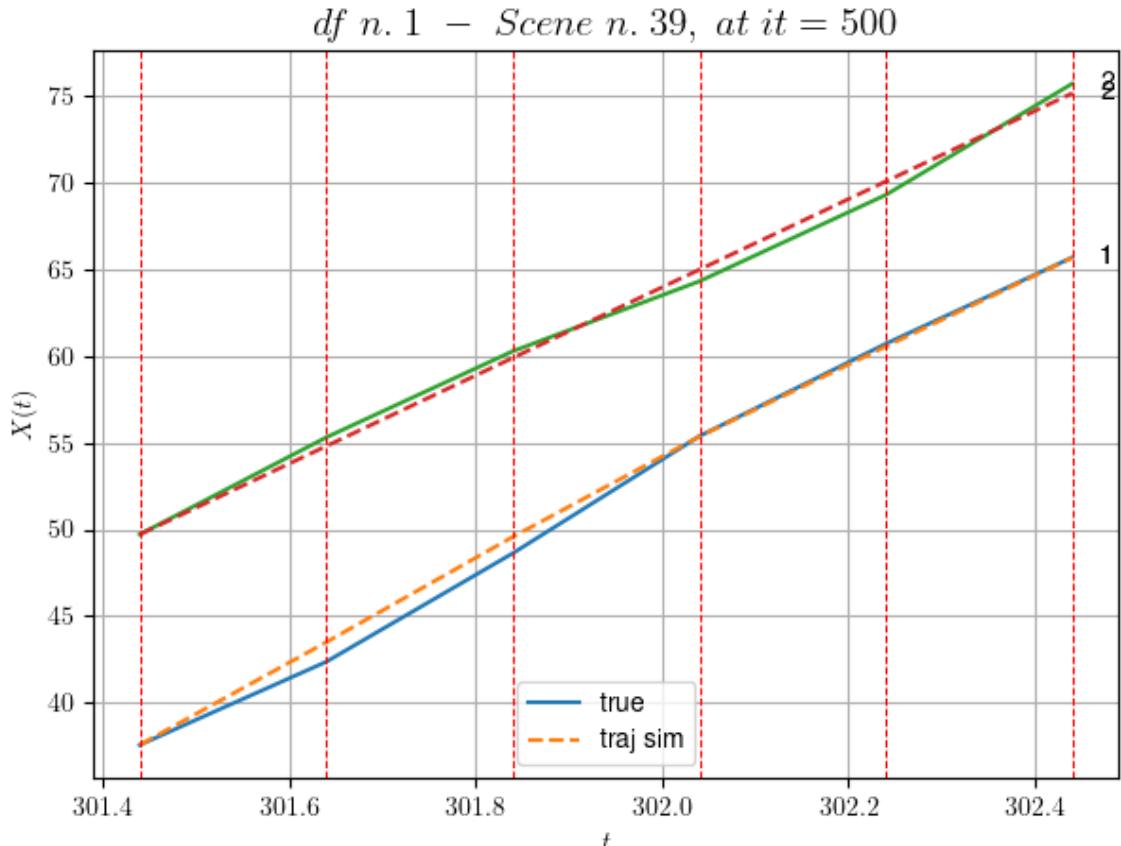


For scene 28/73:

* After LR finder: LR_NN=0.0005 with mse=1.8370728603365696
at it=24
* v0 = 34.92834910020651
* MSE = 0.08982867139268165
* iterations = 500

DataFrame n.1. Scene n.29/73

We have 5 time intervals inside [301.44,302.44]

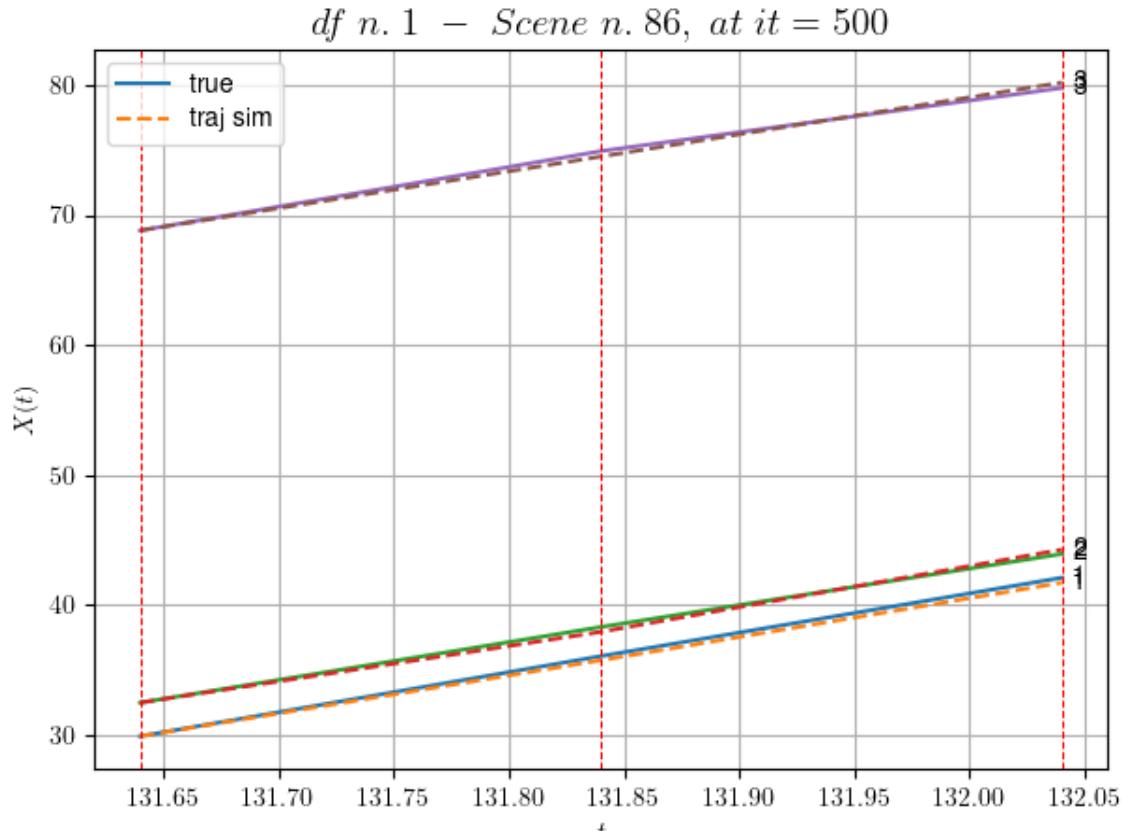


For scene 29/73:

* After LR finder: LR_NN=5e-05 with mse=4.592585479483187 at it=24
* $v_0 = 25.446081747008673$
* MSE = 0.33025198037639514
* iterations = 500

DataFrame n.1. Scene n.30/73

We have 2 time intervals inside [131.64,132.04]

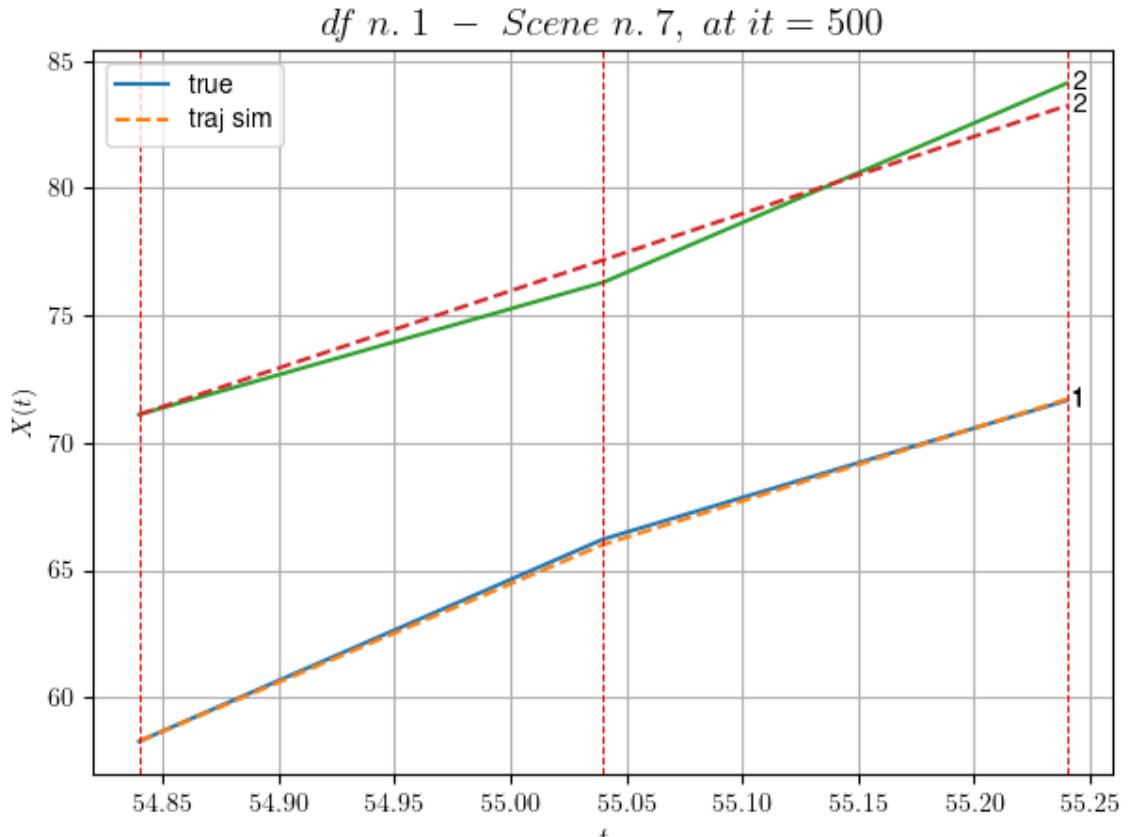


For scene 30/73:

* After LR finder: LR_NN=0.001 with mse=14.956488963044208
at it=24
* $v_0 = 28.442892702247278$
* MSE = 0.09328577716631727
* iterations = 500

DataFrame n.1. Scene n.31/73

We have 2 time intervals inside [54.84,55.24]

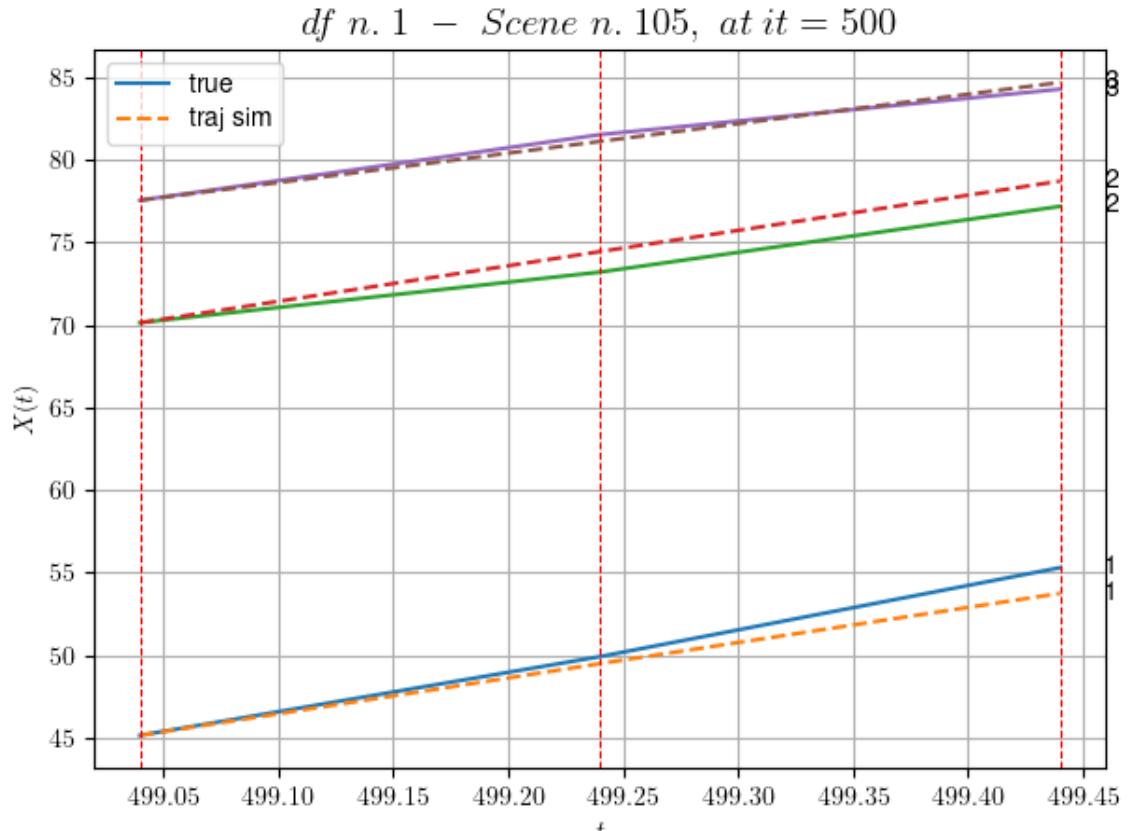


For scene 31/73:

* After LR finder: $LR_NN=0.0005$ with $mse=0.3537935840217966$
7 at it=24
* $v_0 = 30.333444658289164$
* $MSE = 0.26600468120949555$
* iterations = 500

DataFrame n.1. Scene n.32/73

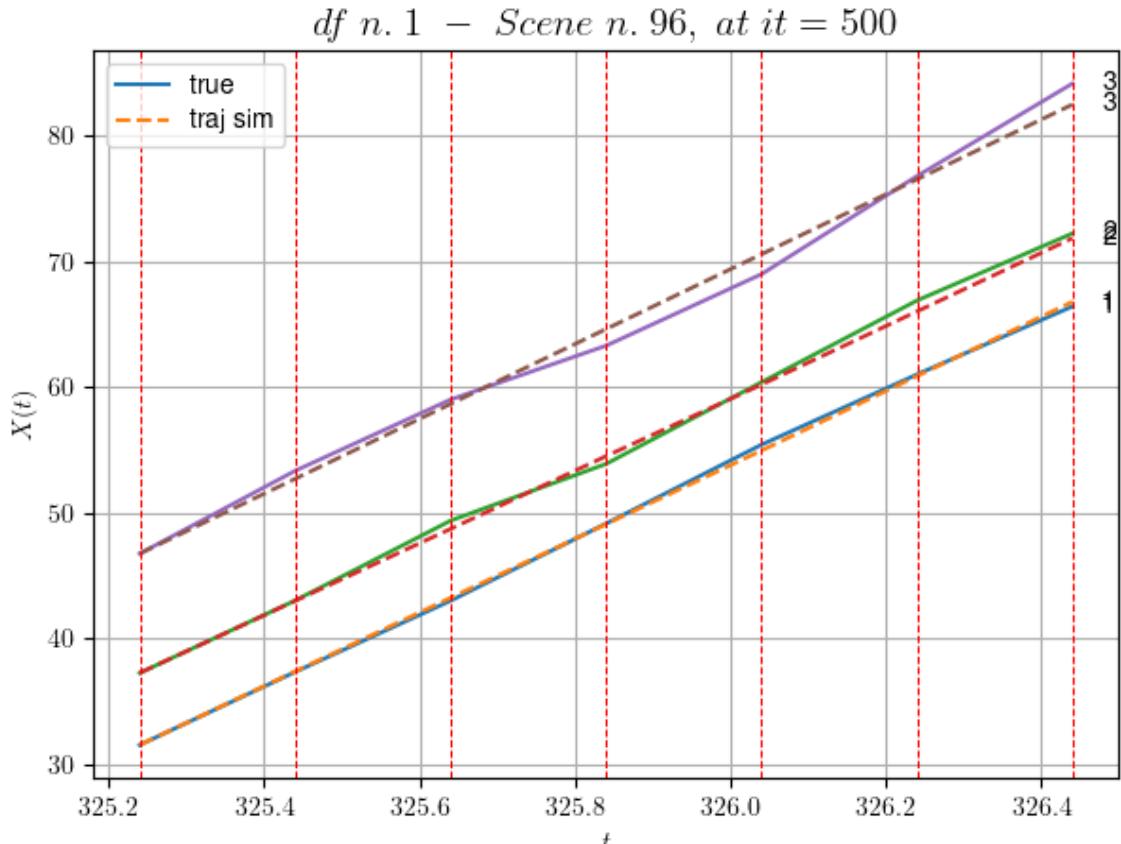
We have 2 time intervals inside [499.04, 499.44]



For scene 32/73:
* After LR finder: $LR_{NN}=0.0001$ with $mse=5.003409043950234$
at $it=24$
* $v_0 = 17.832163517130876$
* $MSE = 0.11743485272160696$
* iterations = 500

DataFrame n.1. Scene n.33/73

We have 6 time intervals inside $[325.24, 326.44]$

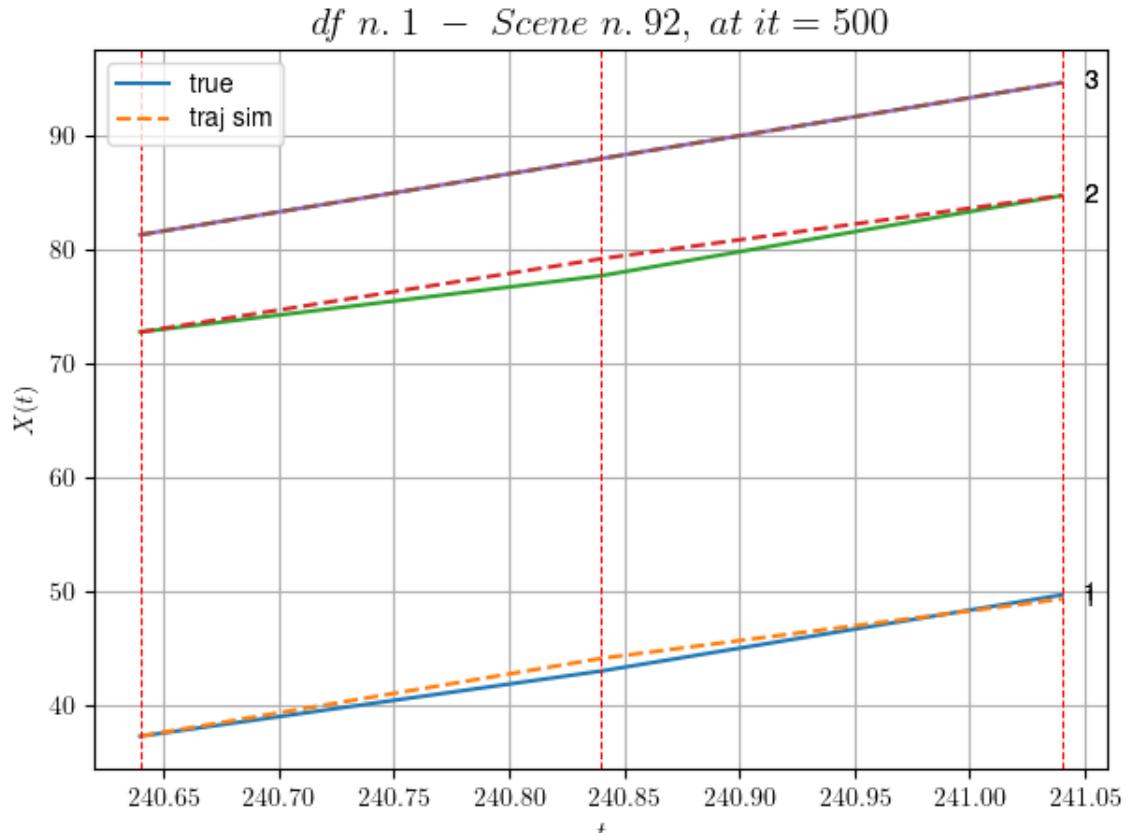


For scene 33/73:

* After LR finder: LR_NN=0.0005 with mse=16.775155827556542
at it=24
* v0 = 29.804033810068955
* MSE = 0.4675324888069364
* iterations = 500

DataFrame n.1. Scene n.34/73

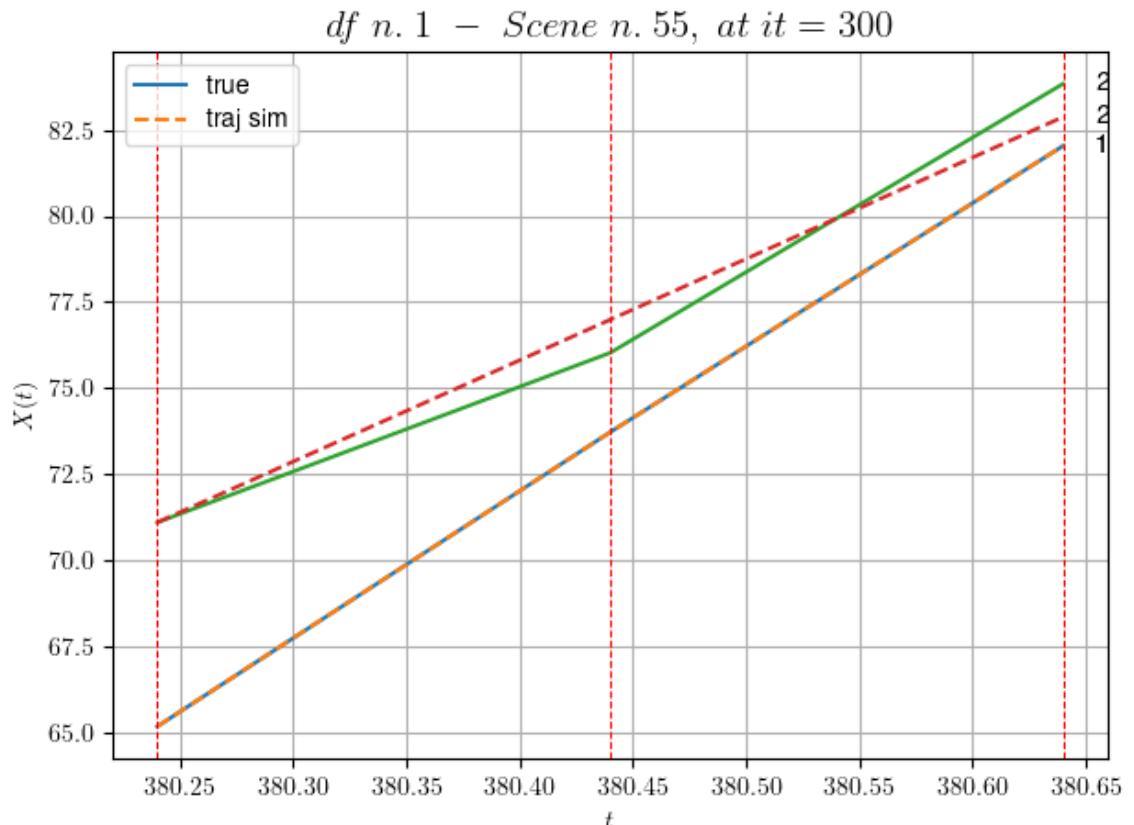
We have 2 time intervals inside [240.64,241.04]



For scene 34/73:
* After LR finder: LR_NN=0.0005 with mse=9.83340744188456 at it=24
* v0 = 33.34476984108596
* MSE = 0.37533015976889694
* iterations = 500

DataFrame n.1. Scene n.35/73

We have 2 time intervals inside [380.24,380.64]

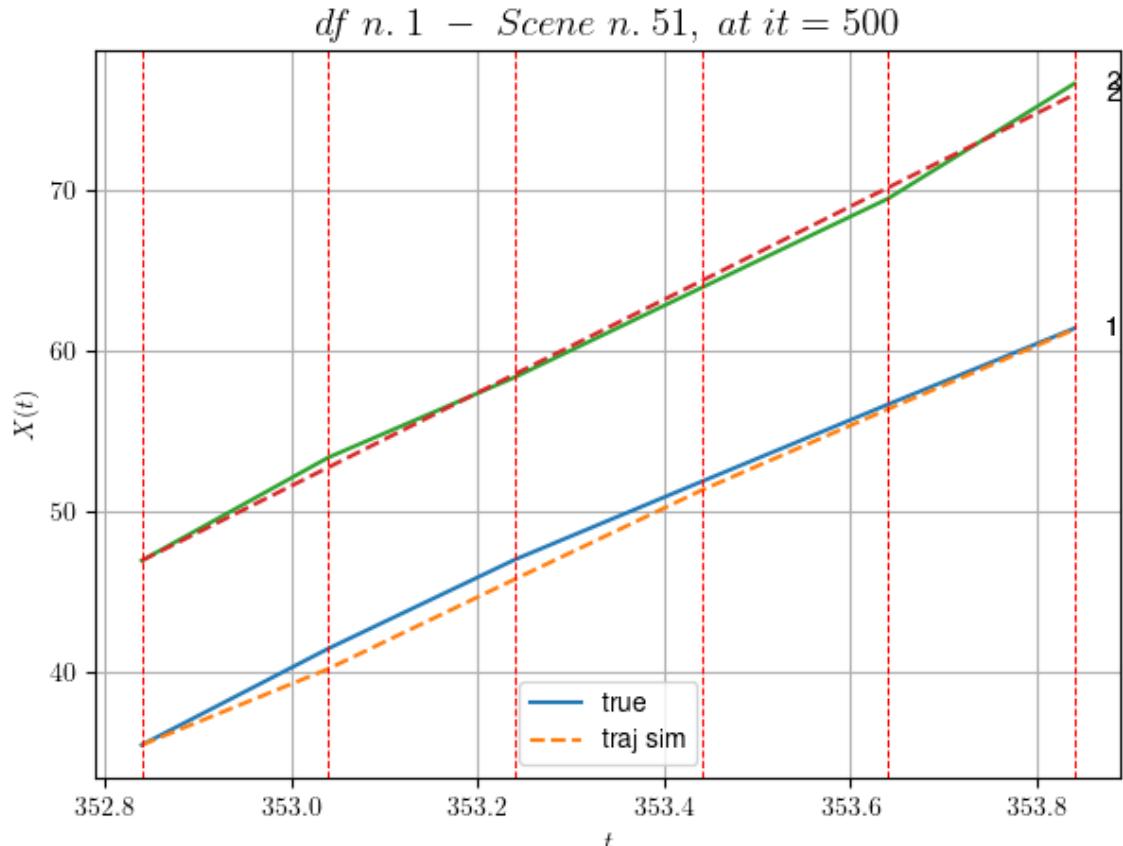


For scene 35/73:

* After LR finder: $LR_NN=0.001$ with $mse=1.4964793428159362$
at $it=24$
* $v_0 = 29.441226387392835$
* $MSE = 0.28519372631725765$
* iterations = 300

DataFrame n.1. Scene n.36/73

We have 5 time intervals inside [352.84,353.84]



For scene 36/73:

* After LR finder: LR_NN=0.001 with mse=0.8061387015471182

at it=24

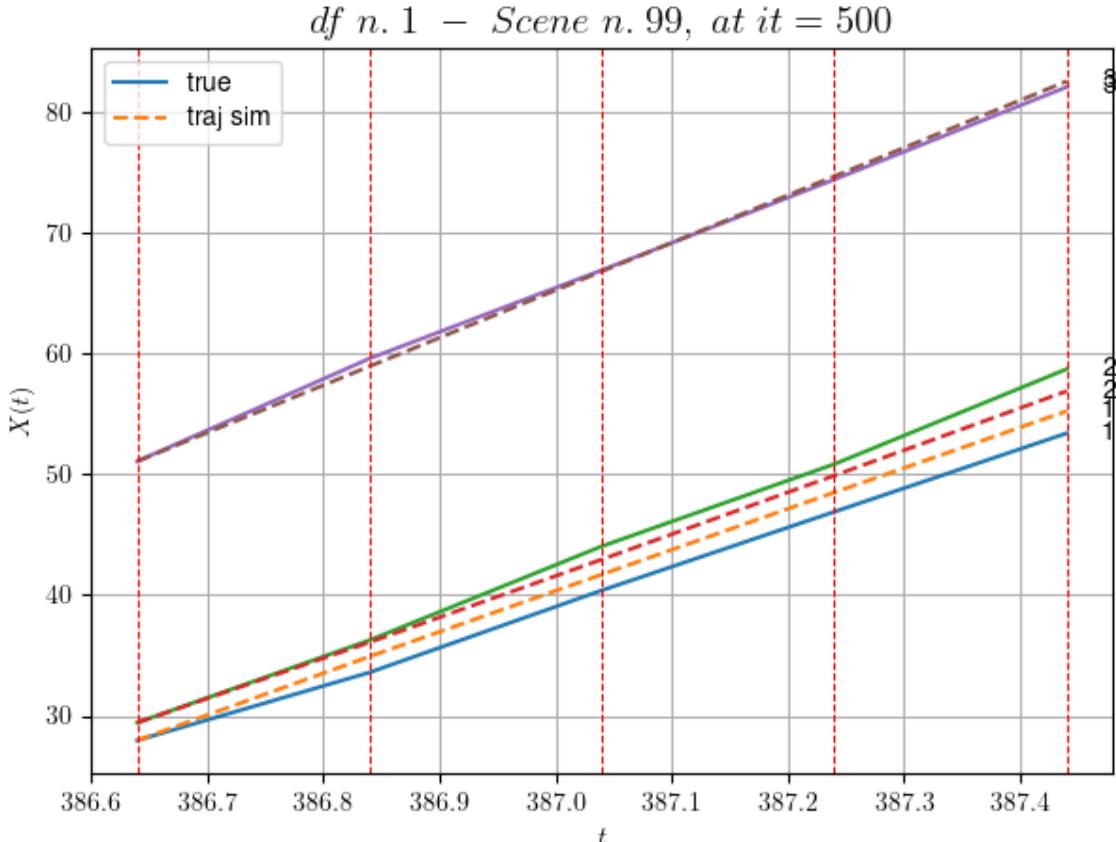
* v0 = 29.028563577797332

* MSE = 0.39282741748517264

* iterations = 500

DataFrame n.1. Scene n.37/73

We have 4 time intervals inside [386.64,387.44]

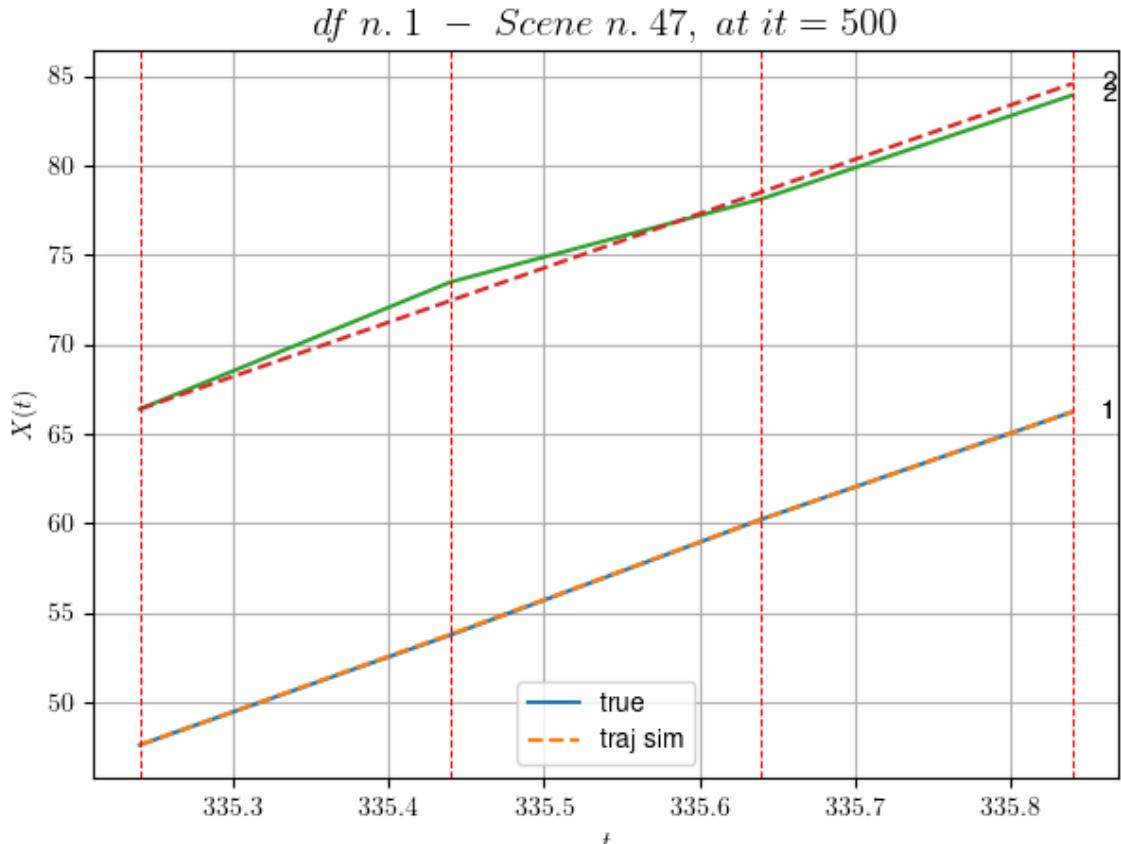


For scene 37/73:

* After LR finder: $LR_NN=0.0005$ with $mse=41.60525081098666$
at it=24
* $v_0 = 39.346100167622374$
* $MSE = 1.0389021179395872$
* iterations = 500

DataFrame n.1. Scene n.38/73

We have 3 time intervals inside [335.24,335.84]

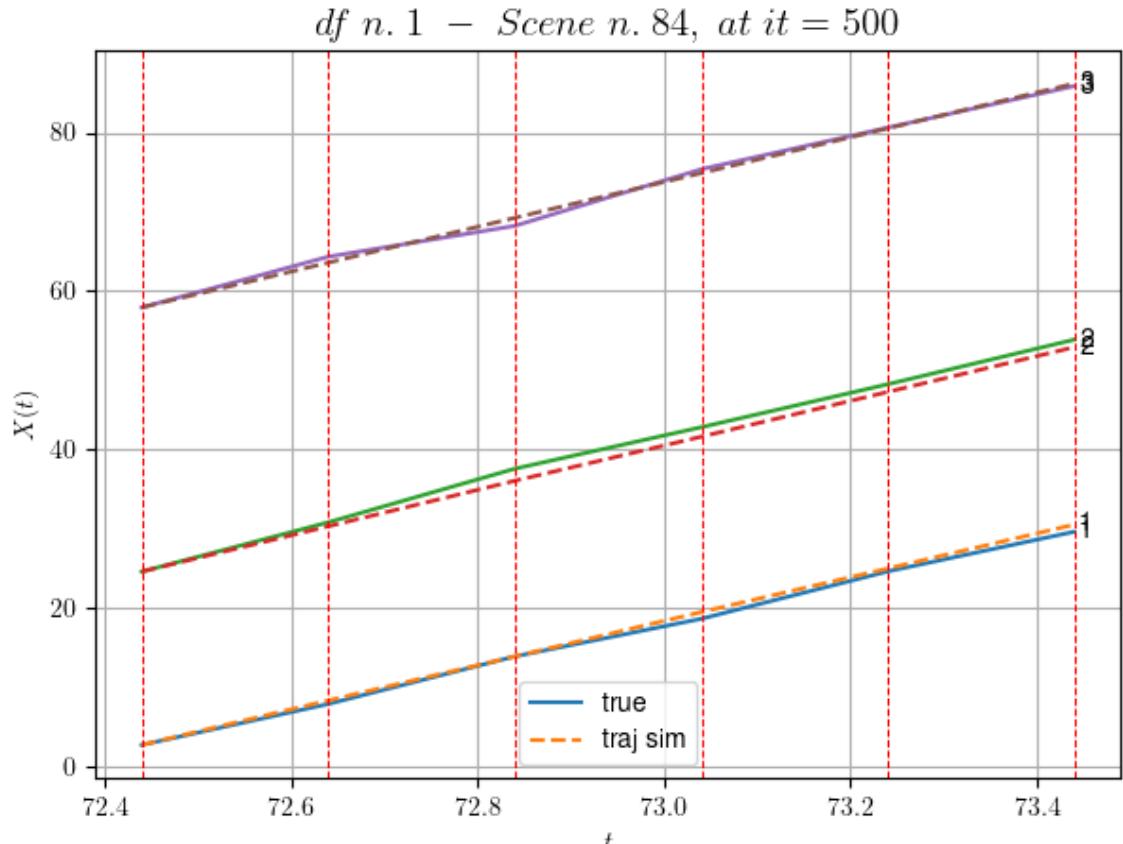


For scene 38/73:

* After LR finder: LR_NN=5e-05 with mse=0.18742437950640747
at it=24
* v0 = 30.337239387449323
* MSE = 0.18909620699514376
* iterations = 500

DataFrame n.1. Scene n.39/73

We have 5 time intervals inside [72.44,73.44]

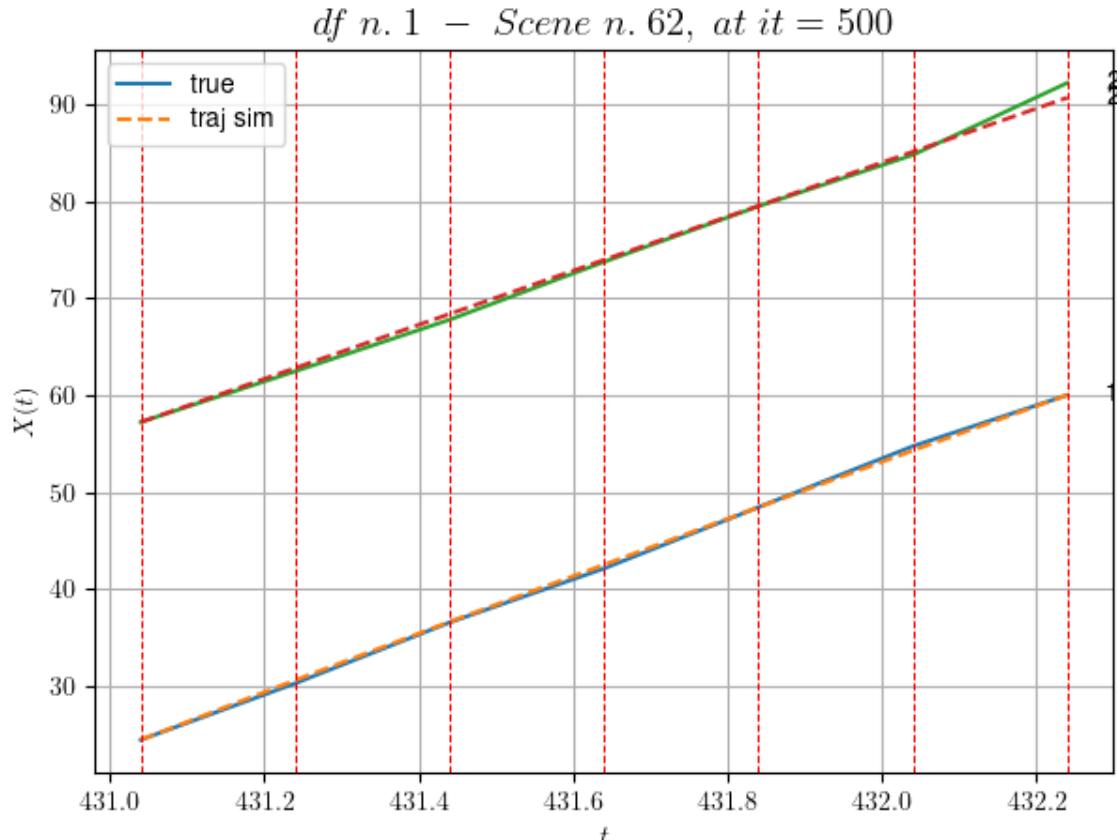


For scene 39/73:

* After LR finder: LR_NN=5e-05 with mse=3.456228116610409 at it=24
* v0 = 28.250920573908203
* MSE = 0.216171776364282
* iterations = 500

DataFrame n.1. Scene n.40/73

We have 6 time intervals inside [431.04,432.24]

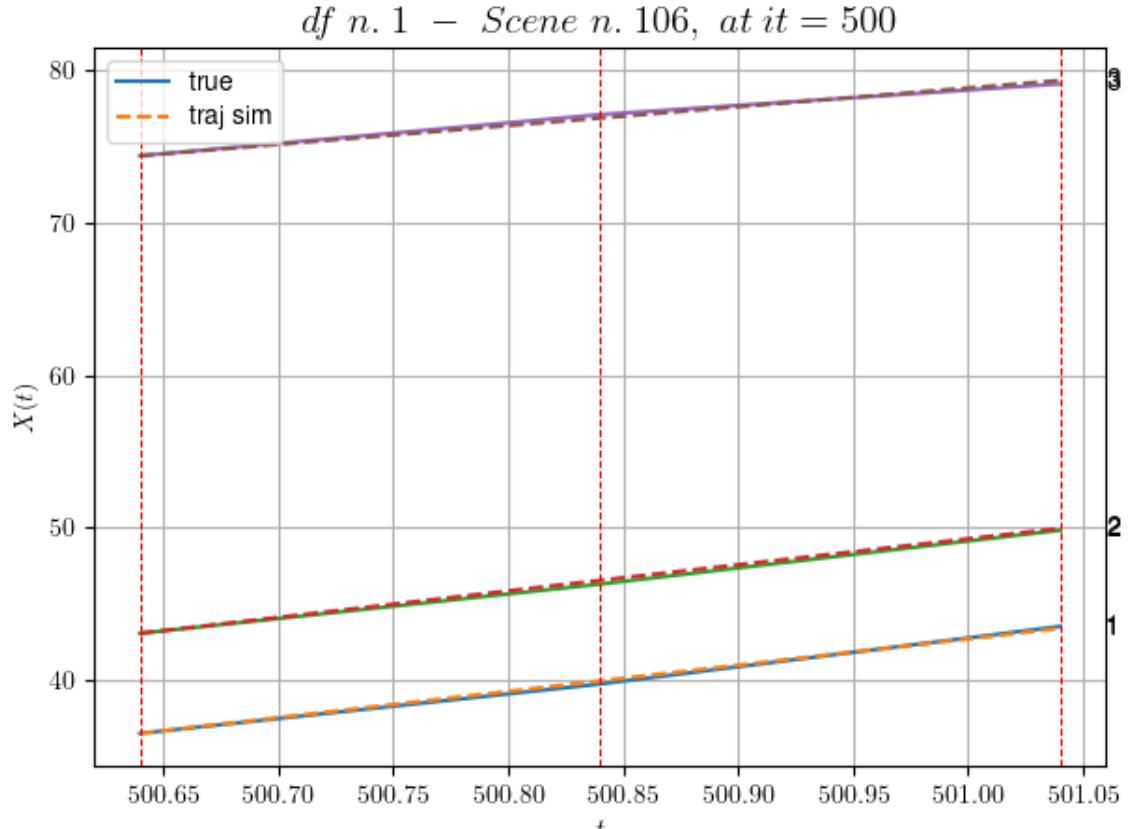


For scene 40/73:

* After LR finder: LR_NN=5e-05 with mse=1.0713591414440236
at it=24
* v0 = 27.91482717316346
* MSE = 0.22534708834907574
* iterations = 500

DataFrame n.1. Scene n.41/73

We have 2 time intervals inside [500.64, 501.04]

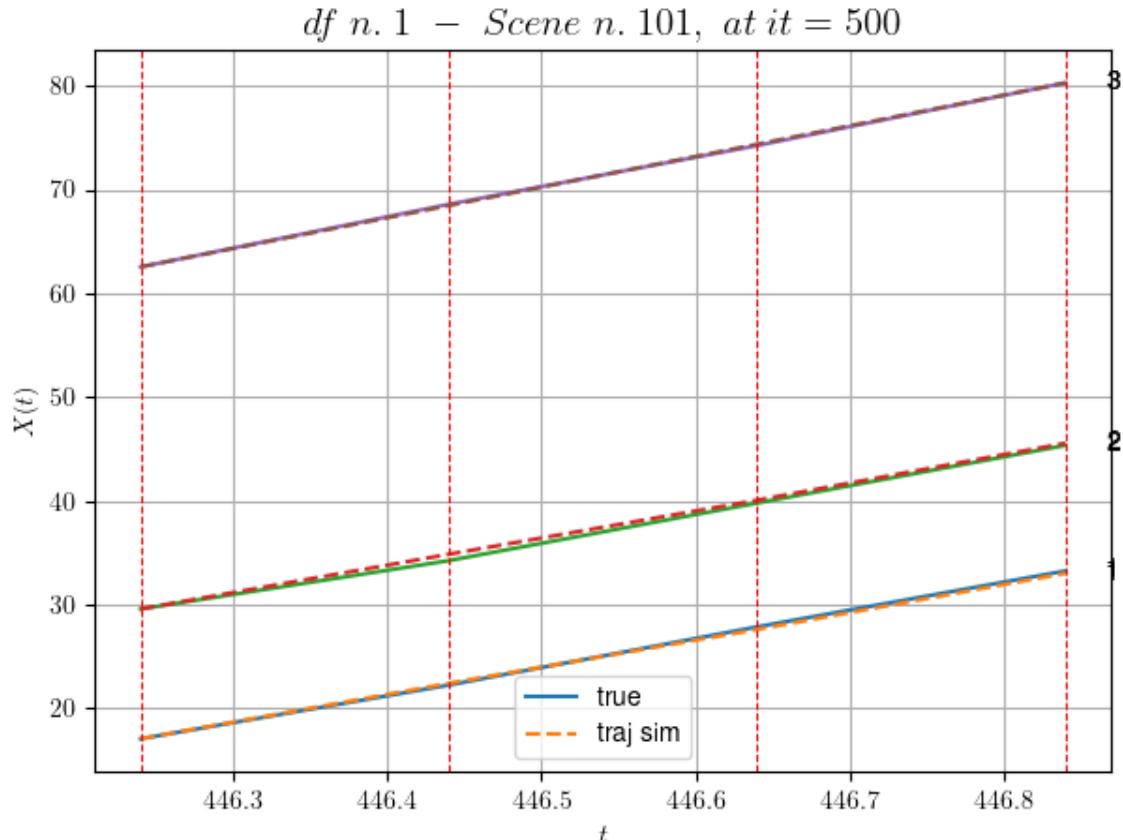


For scene 41/73:

* After LR finder: LR_NN=5e-05 with mse=10.965984562109453
at it=24
* v0 = 12.361370218694217
* MSE = 0.02674839686302487
* iterations = 500

DataFrame n.1. Scene n.42/73

We have 3 time intervals inside [446.24, 446.84]

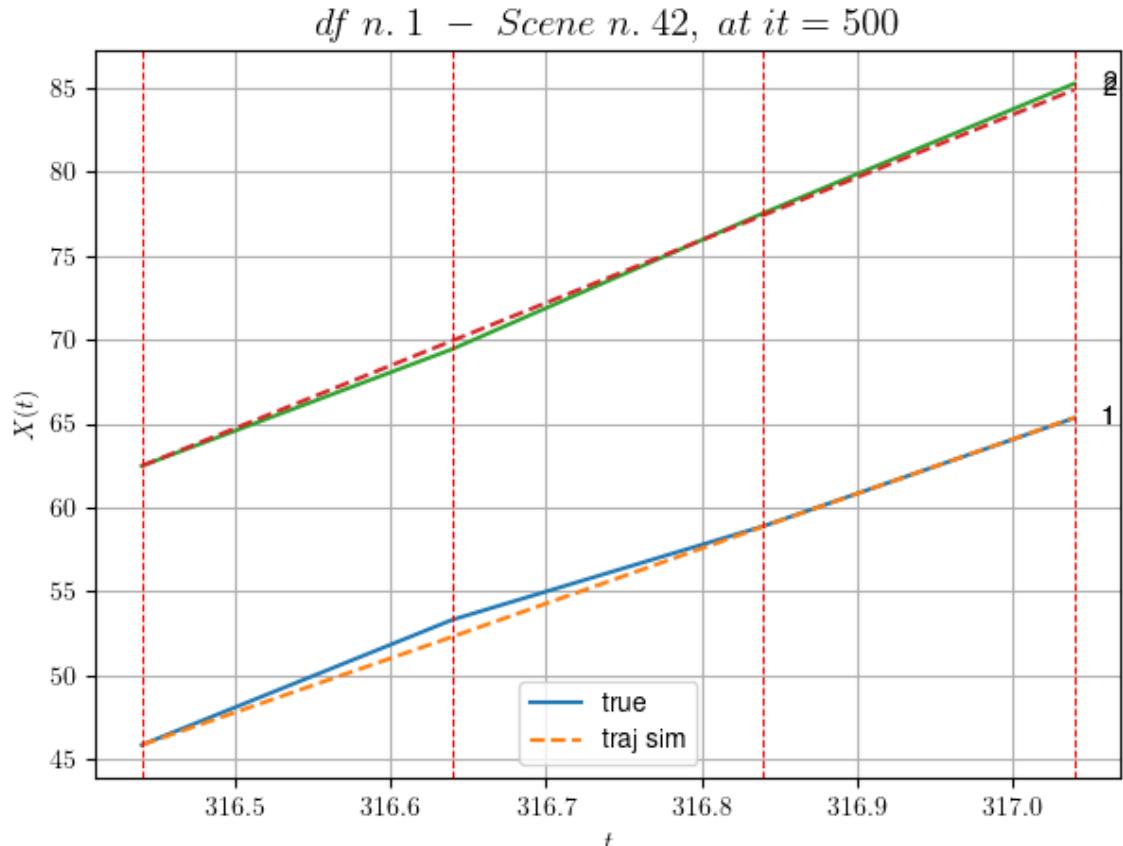


For scene 42/73:

* After LR finder: $LR_{NN}=0.0005$ with $mse=11.722506665700267$
at it=24
* $v_0 = 29.554429209126017$
* MSE = 0.05554586664877036
* iterations = 500

DataFrame n.1. Scene n.43/73

We have 3 time intervals inside [316.44, 317.04]

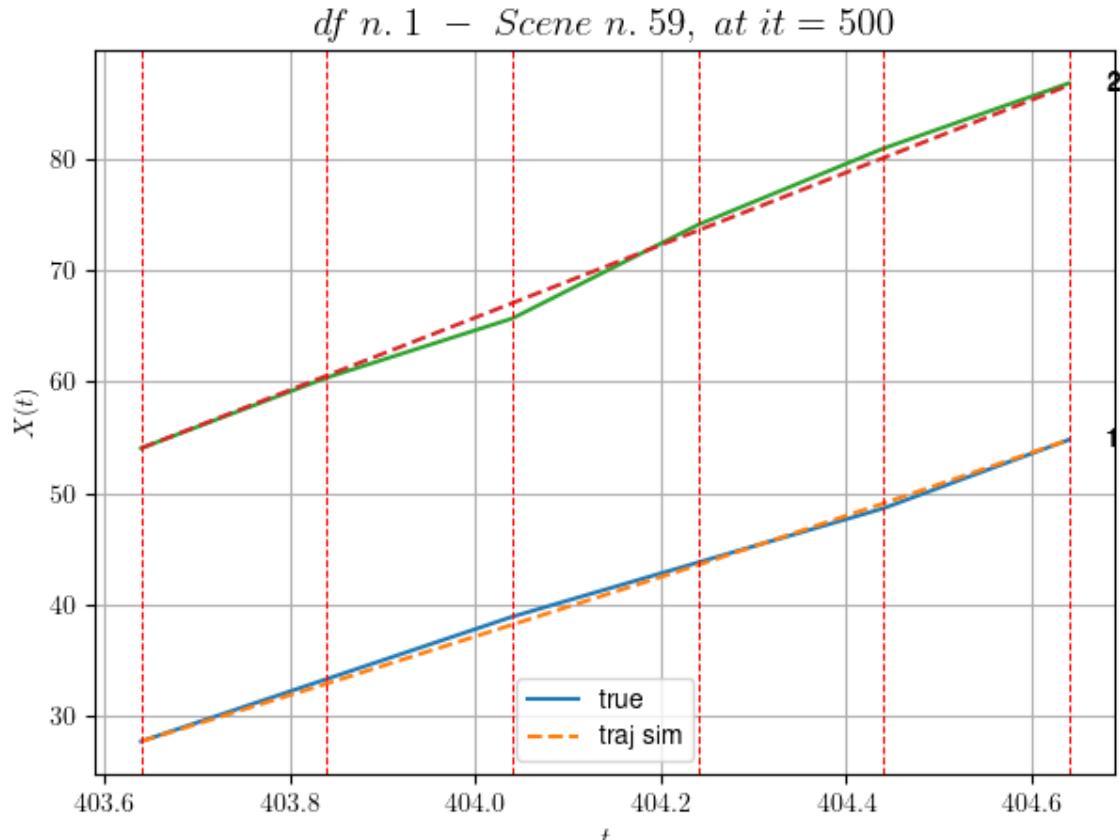


For scene 43/73:

* After LR finder: LR_NN=5e-05 with mse=4.399013000498776 at it=24
* v0 = 37.334341227146695
* MSE = 0.1765829660543446
* iterations = 500

DataFrame n.1. Scene n.44/73

We have 5 time intervals inside [403.64,404.64]

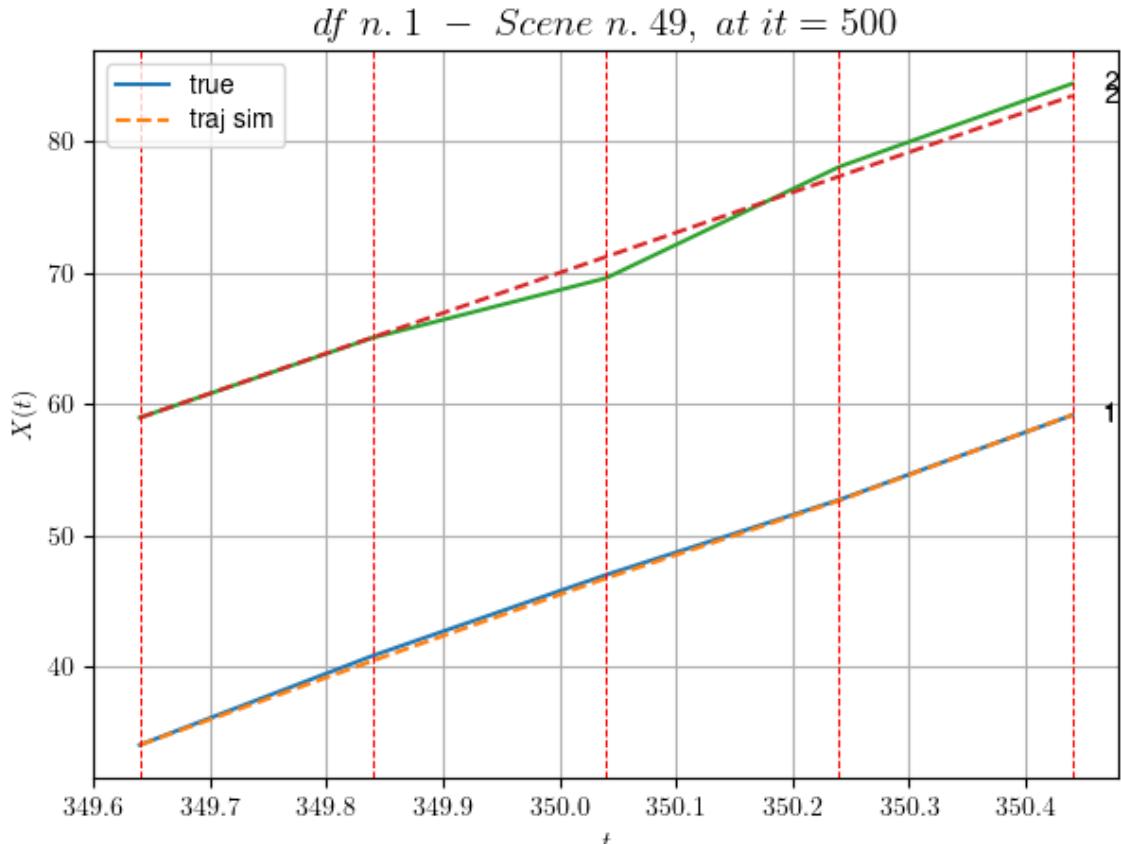


For scene 44/73:

* After LR finder: $LR_NN=0.0001$ with $mse=1.902988686624861$
at it=24
* $v_0 = 32.57978285326546$
* $MSE = 0.3241589291008051$
* iterations = 500

DataFrame n.1. Scene n.45/73

We have 4 time intervals inside [349.64, 350.44]

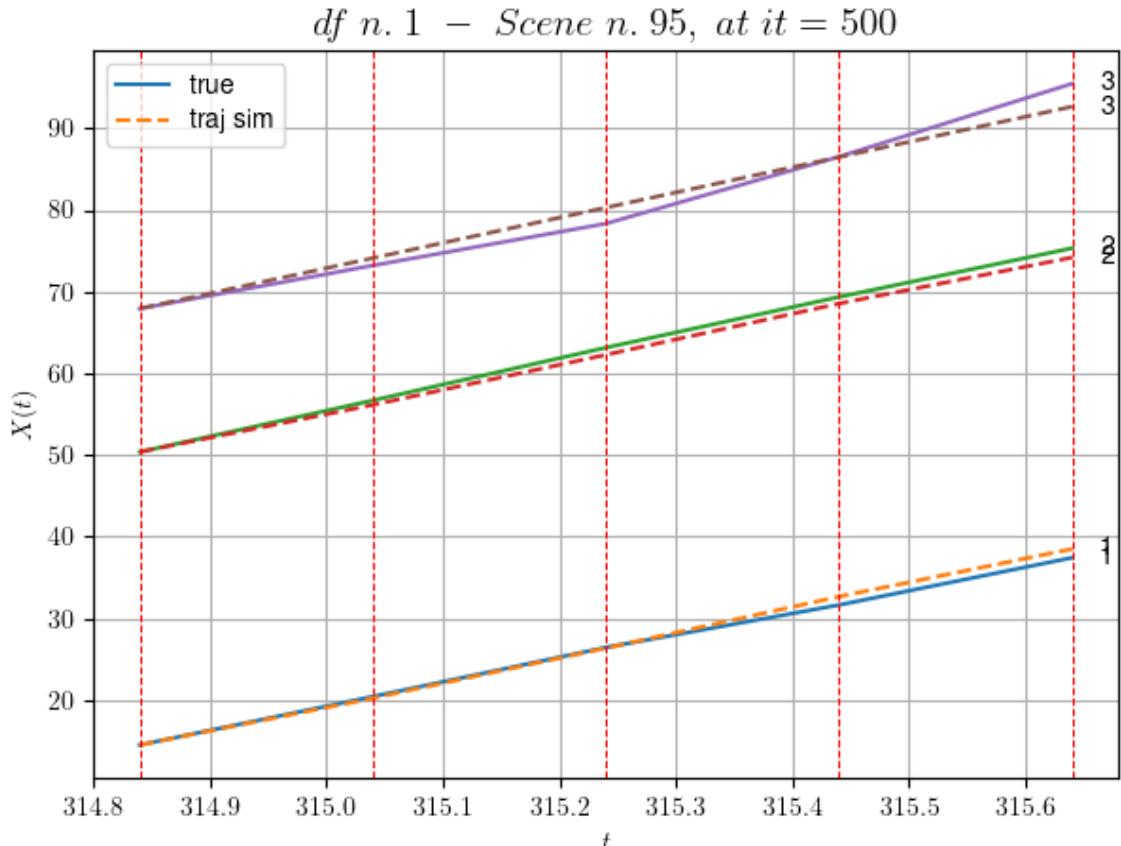


For scene 45/73:

* After LR finder: LR_NN=5e-05 with mse=0.5490026974173056
at it=24
* v0 = 30.663808885196218
* MSE = 0.42662630158691545
* iterations = 500

DataFrame n.1. Scene n.46/73

We have 4 time intervals inside [314.84,315.64]

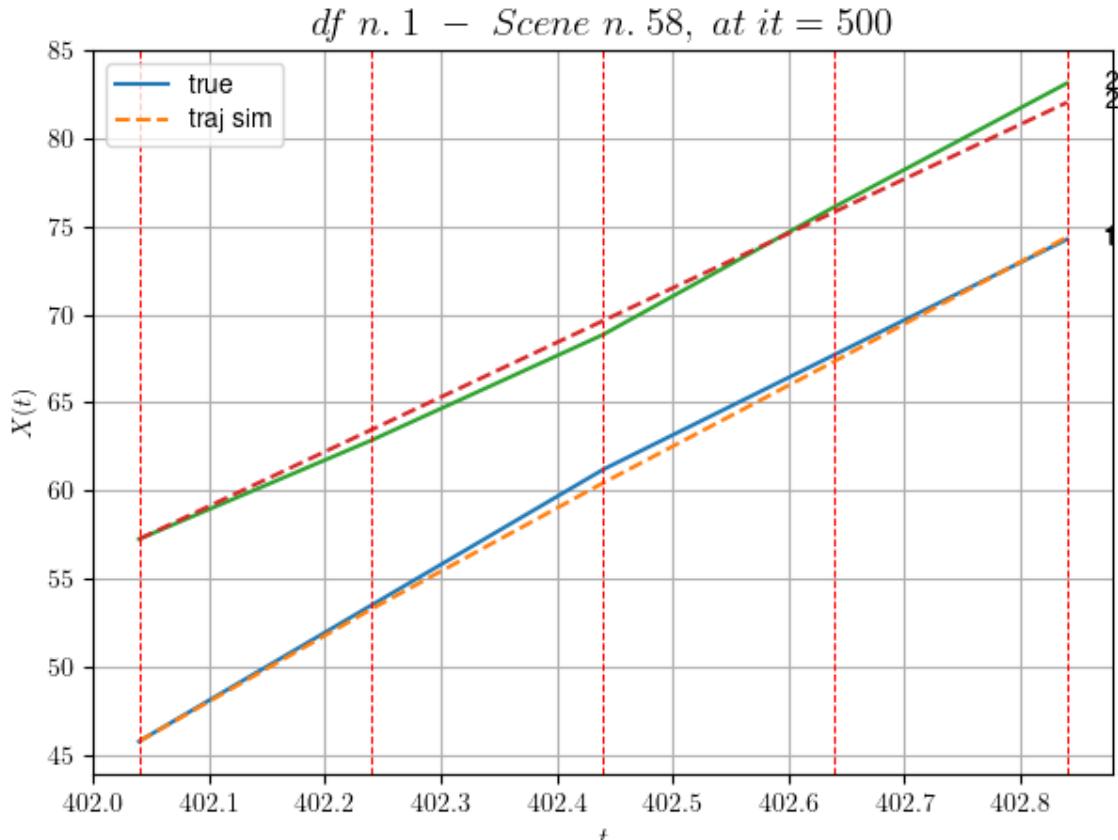


For scene 46/73:

* After LR finder: LR_NN=0.0005 with mse=21.23470791832618
at it=24
* v0 = 30.926247858927358
* MSE = 1.1736906502709623
* iterations = 500

DataFrame n.1. Scene n.47/73

We have 4 time intervals inside [402.04,402.84]

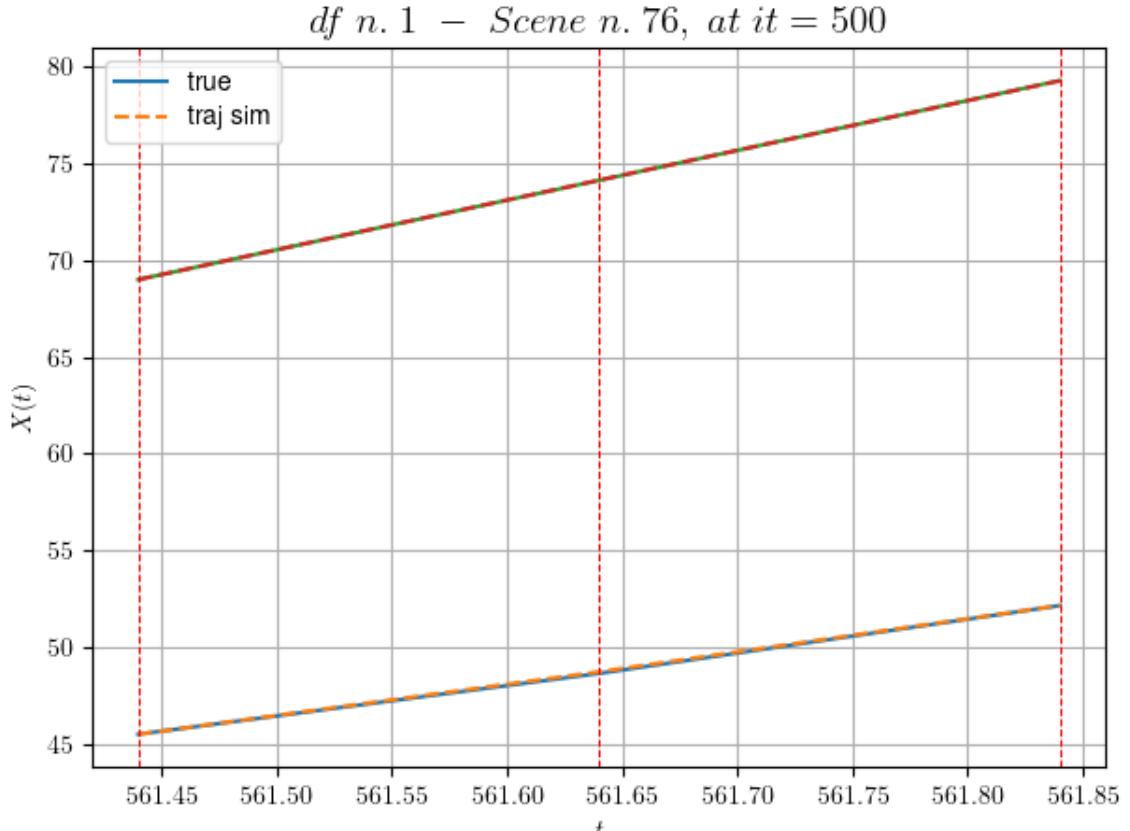


For scene 47/73:

- * After LR finder: LR_NN=5e-05 with mse=0.6412128635272218
- at it=24
- * v0 = 31.00675921223539
- * MSE = 0.30436806171724307
- * iterations = 500

DataFrame n.1. Scene n.48/73

We have 2 time intervals inside [561.44, 561.84]

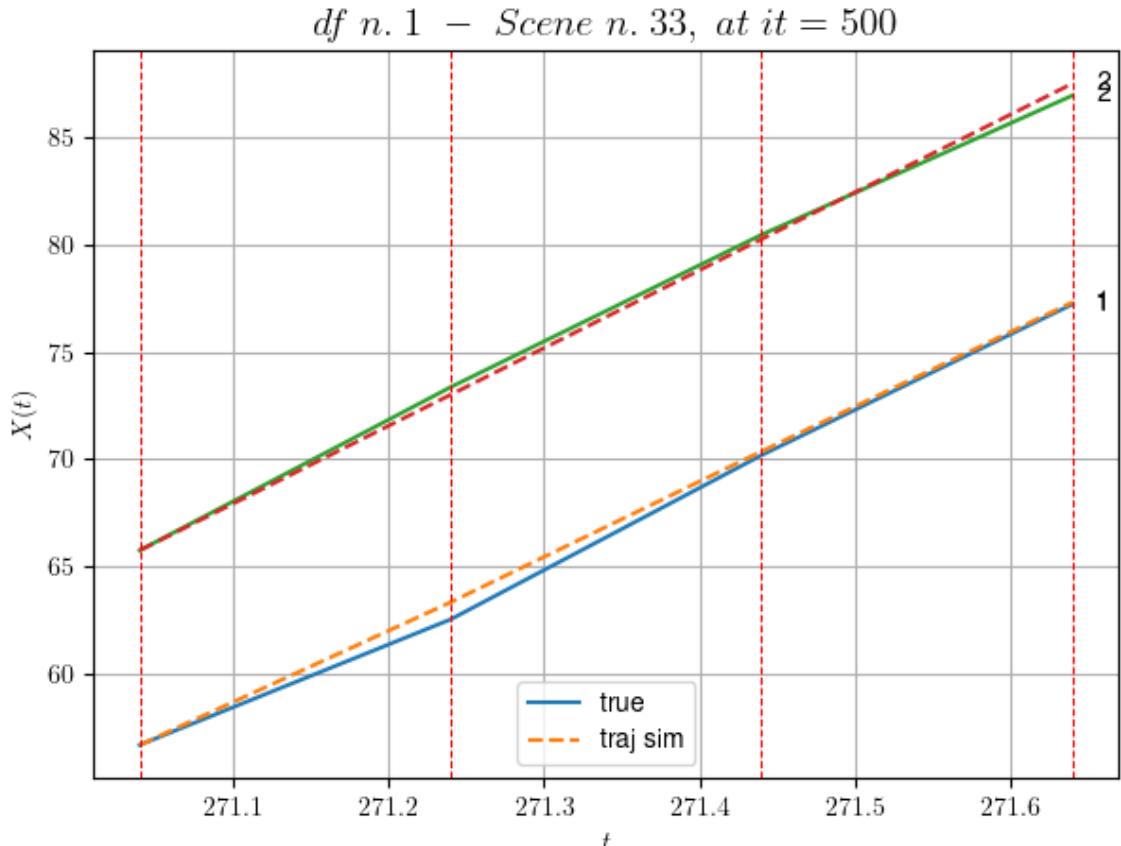


For scene 48/73:

* After LR finder: LR_NN=5e-05 with mse=0.6063873337952328
at it=24
* v0 = 25.727722160465227
* MSE = 0.0012846413892055963
* iterations = 500

DataFrame n.1. Scene n.49/73

We have 3 time intervals inside [271.04,271.64]

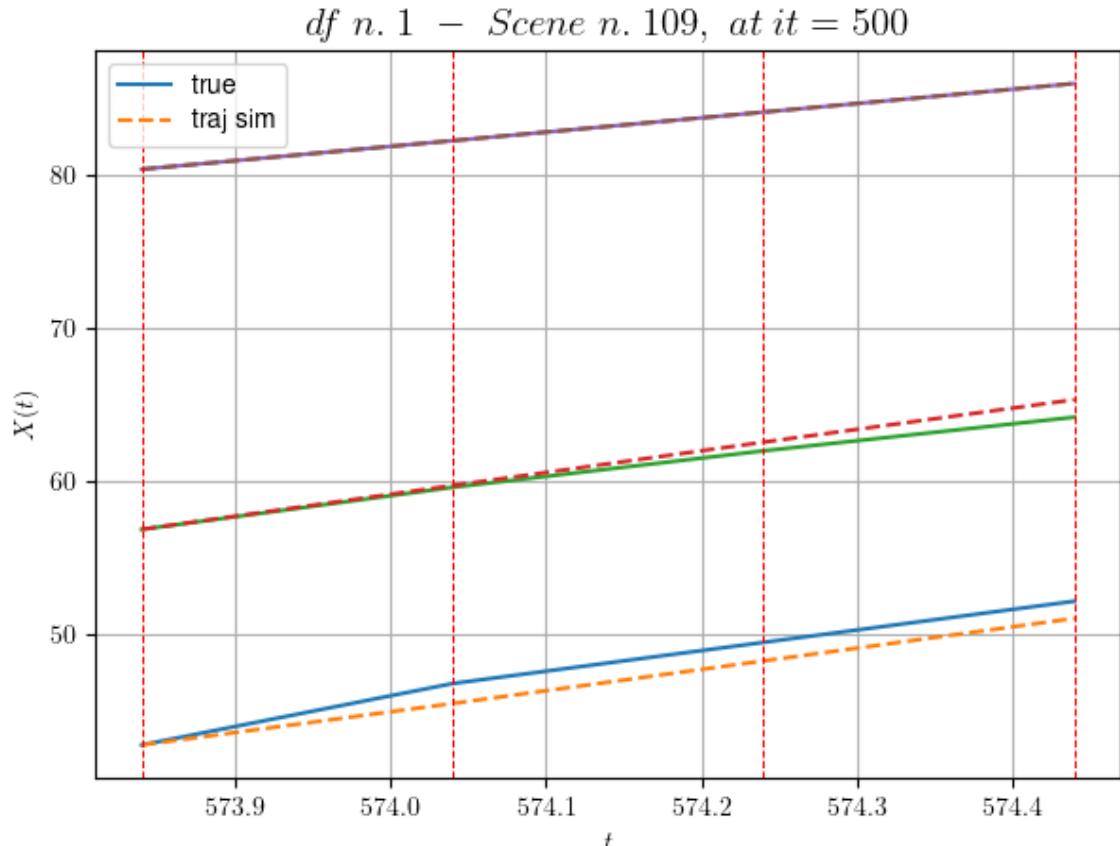


For scene 49/73:

* After LR finder: LR_NN=0.0001 with mse=2.5607495409155003
at it=24
* v0 = 36.29888466501554
* MSE = 0.14518795359807196
* iterations = 500

DataFrame n.1. Scene n.50/73

We have 3 time intervals inside [573.84,574.44]

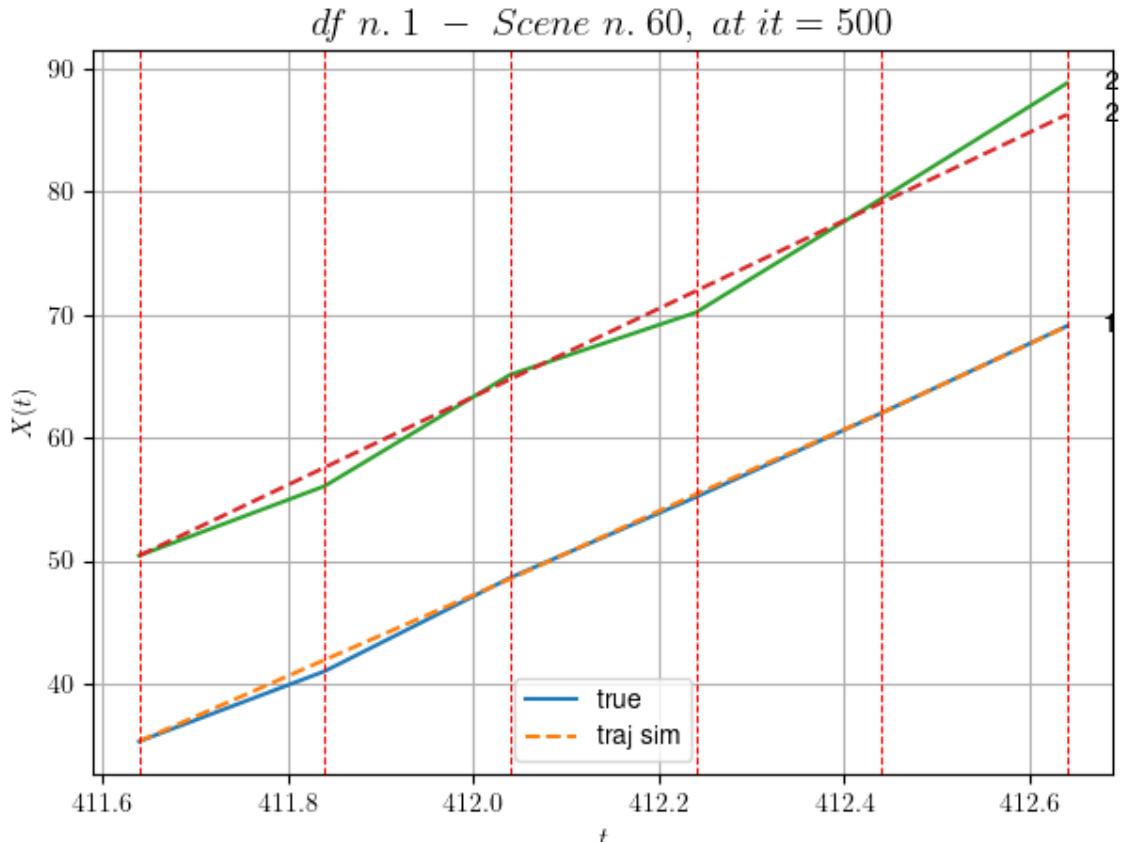


For scene 50/73:

* After LR finder: LR_NN=0.0001 with mse=22.535124562994582
at it=24
* v0 = 9.338719660906778
* MSE = 0.48993089340932694
* iterations = 500

DataFrame n.1. Scene n.51/73

We have 5 time intervals inside [411.64,412.64]



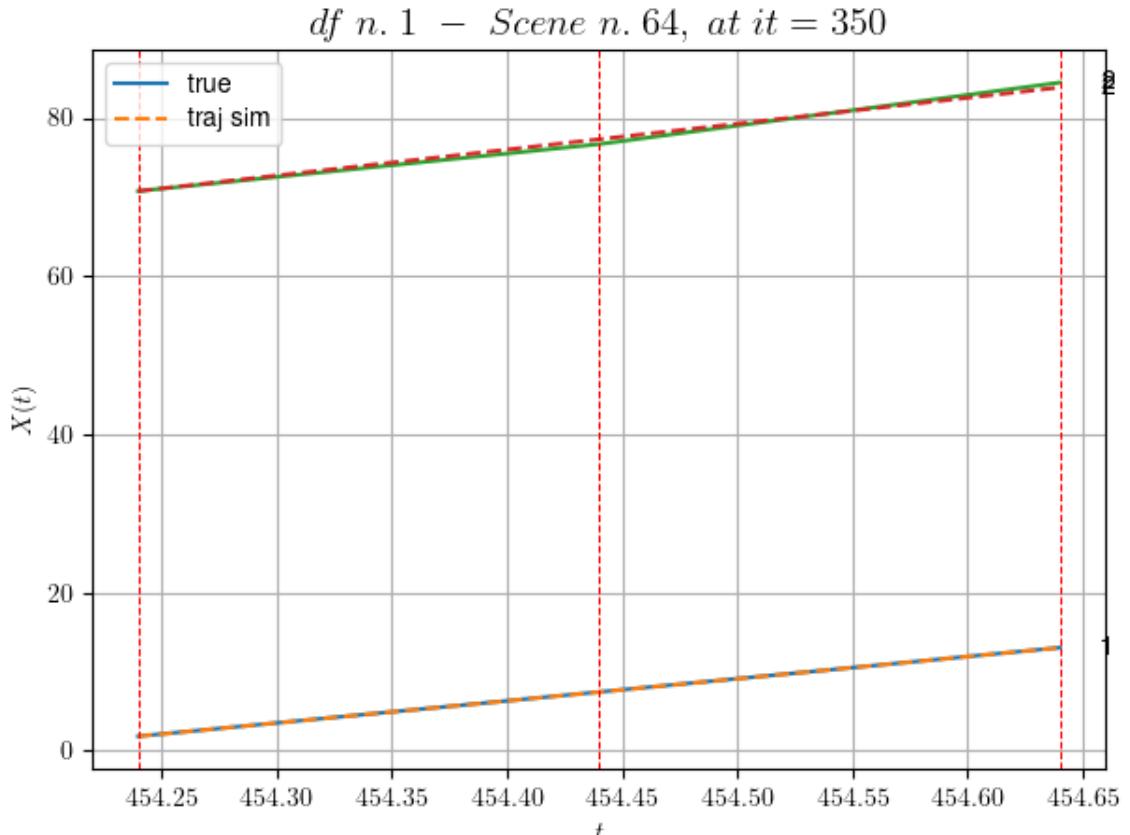
For scene 51/73:

* After LR finder: $LR_NN=5e-05$ with $mse=8.960591234579974$ at
it=24

- * $v_0 = 35.85294111711285$
- * MSE = 1.086976248362324
- * iterations = 500

DataFrame n.1. Scene n.52/73

We have 2 time intervals inside [454.24, 454.64]

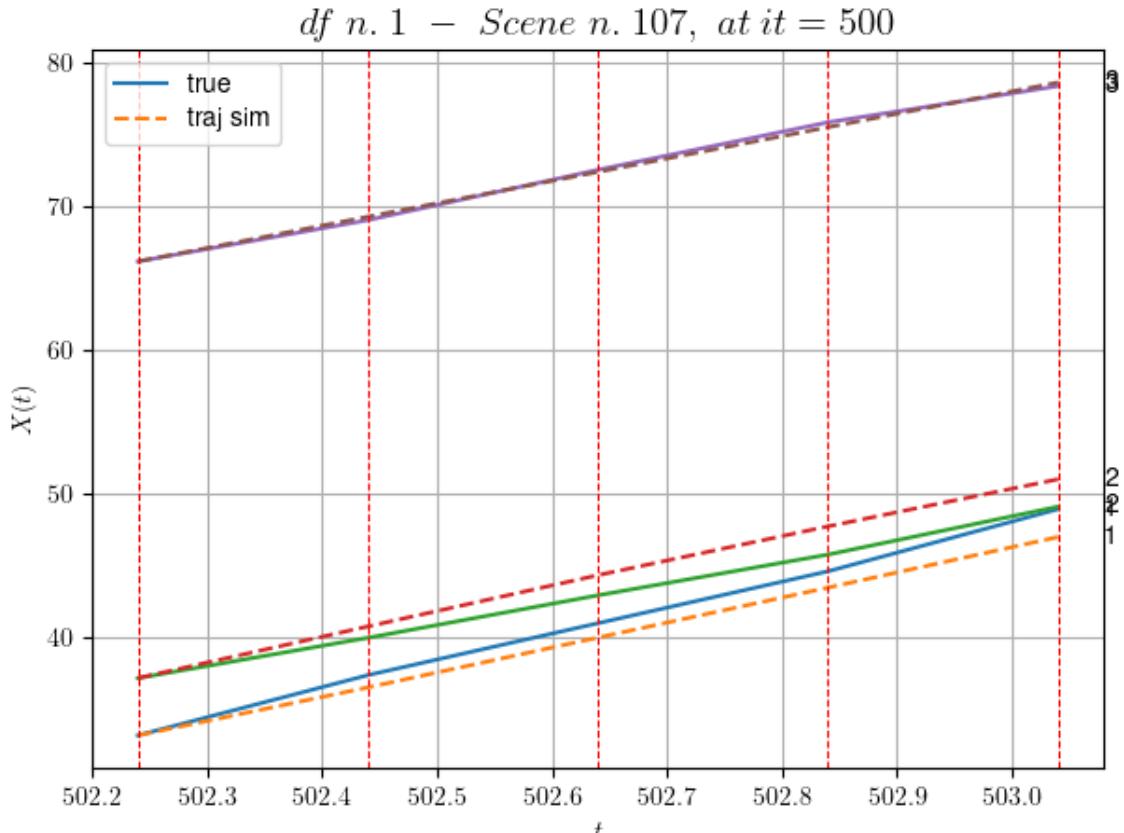


For scene 52/73:

* After LR finder: LR_NN=5e-05 with mse=0.498238930759646 at it=24
* v0 = 32.76709588615878
* MSE = 0.12848751029968788
* iterations = 350

DataFrame n.1. Scene n.53/73

We have 4 time intervals inside [502.24,503.04]

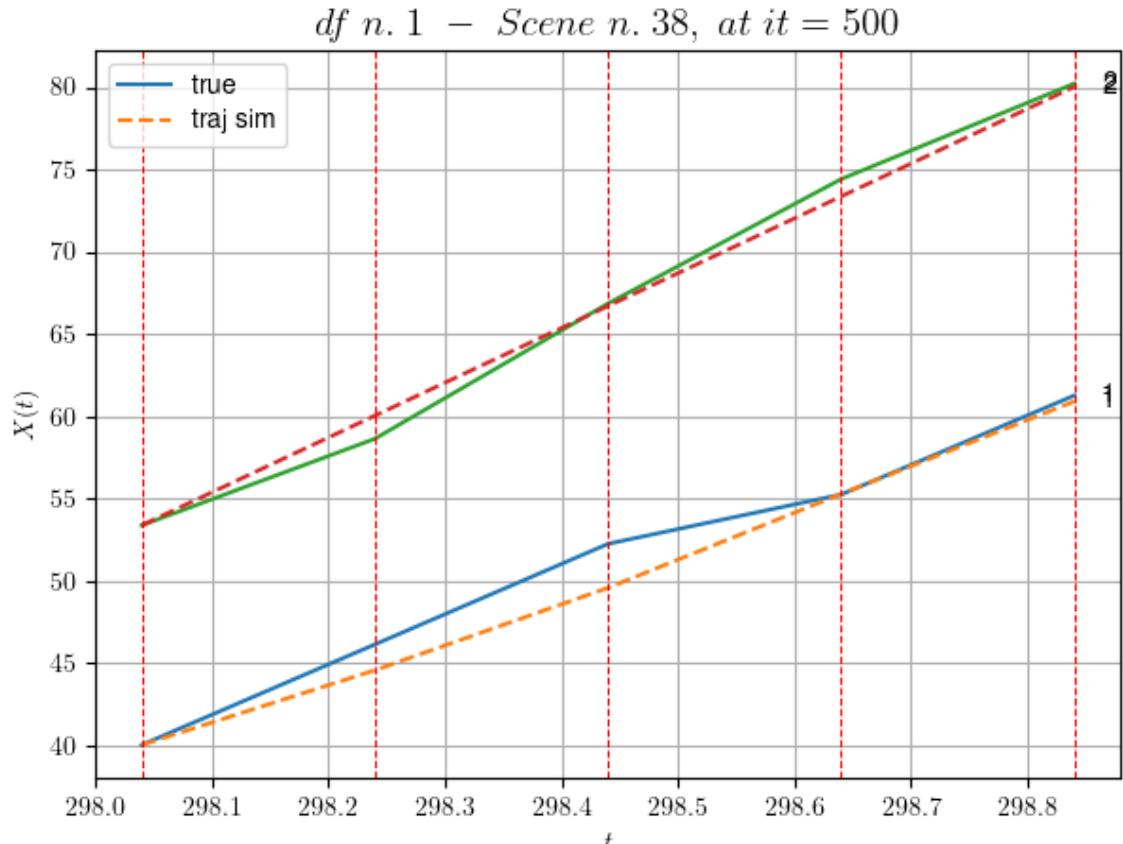


For scene 53/73:

- * After LR finder: LR_NN=0.001 with mse=31.61619184001672 at it=24
- * v0 = 15.581016722934077
- * MSE = 1.1432574207113586
- * iterations = 500

DataFrame n.1. Scene n.54/73

We have 4 time intervals inside [298.04,298.84]

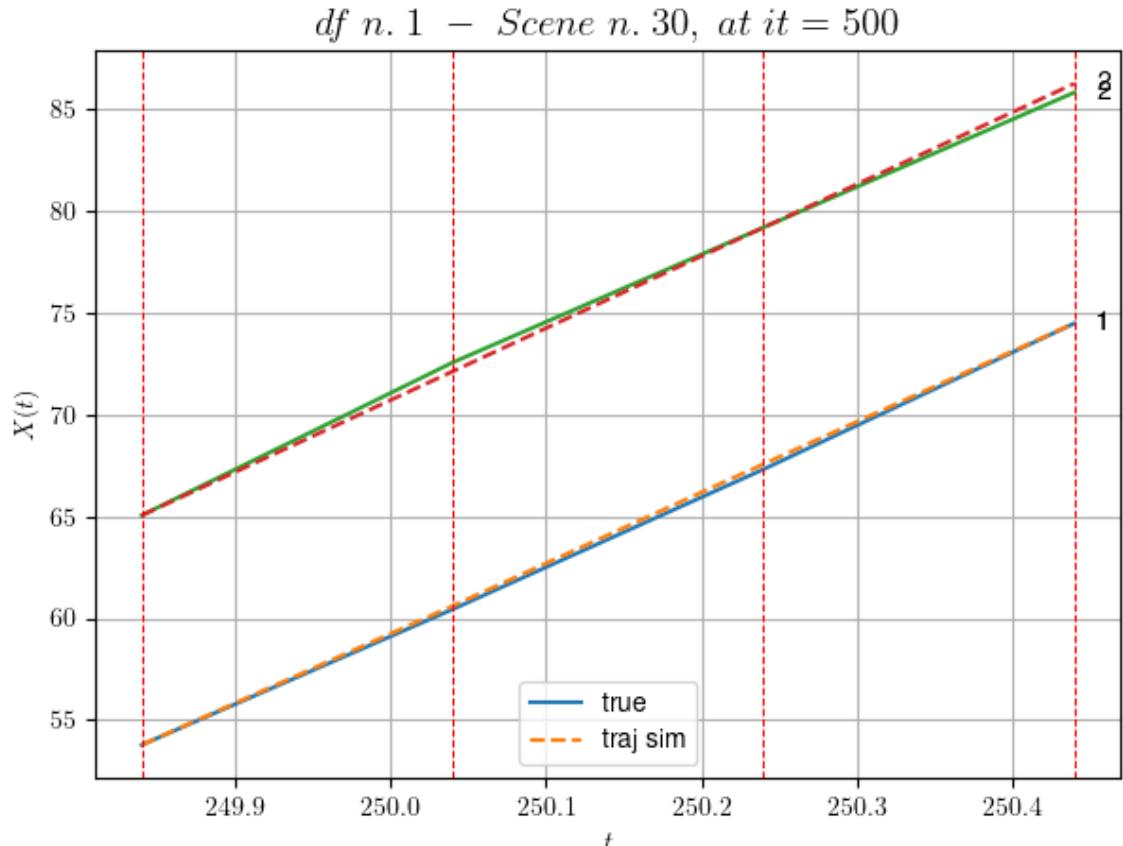


For scene 54/73:

* After LR finder: LR_NN=0.0005 with mse=3.429591394639826
at it=24
* v0 = 33.34266245905147
* MSE = 1.167422031615473
* iterations = 500

DataFrame n.1. Scene n.55/73

We have 3 time intervals inside [249.84,250.44]

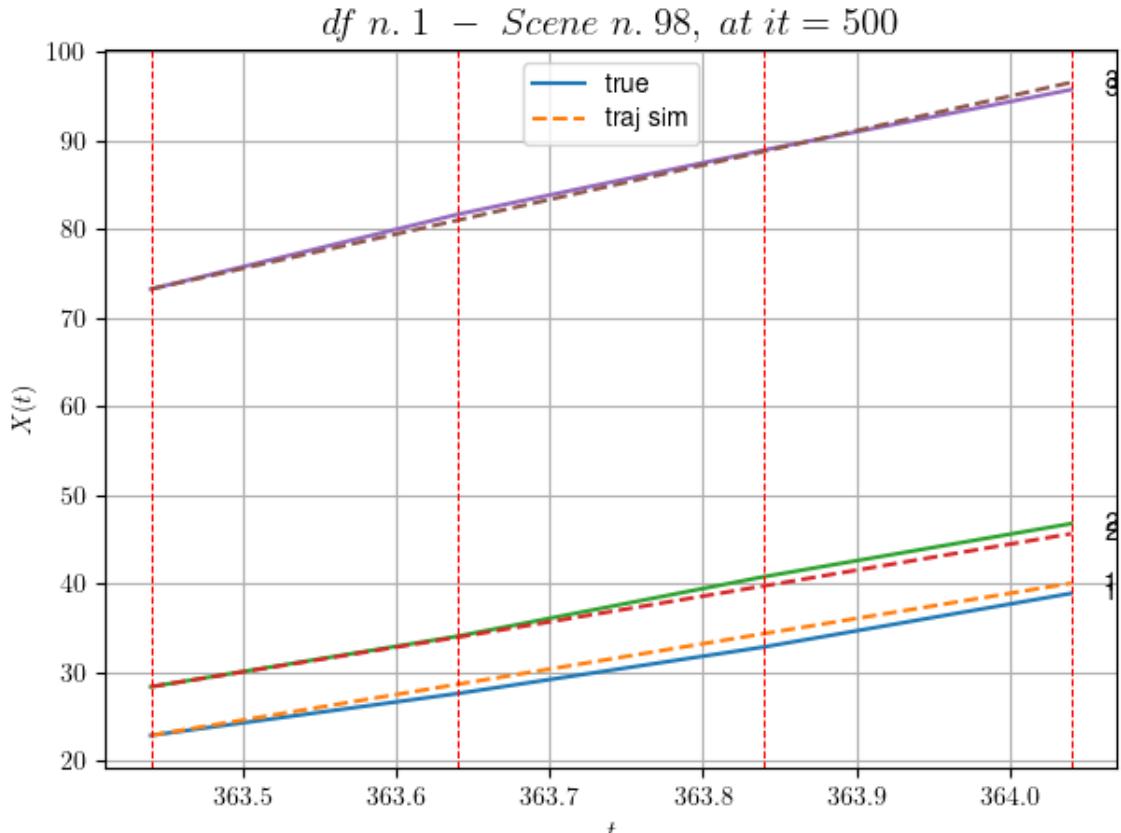


For scene 55/73:

* After LR finder: LR_NN=5e-05 with mse=1.8387037630821137
at it=24
* v0 = 35.36623656084784
* MSE = 0.05308568165924778
* iterations = 500

DataFrame n.1. Scene n.56/73

We have 3 time intervals inside [363.44,364.04]

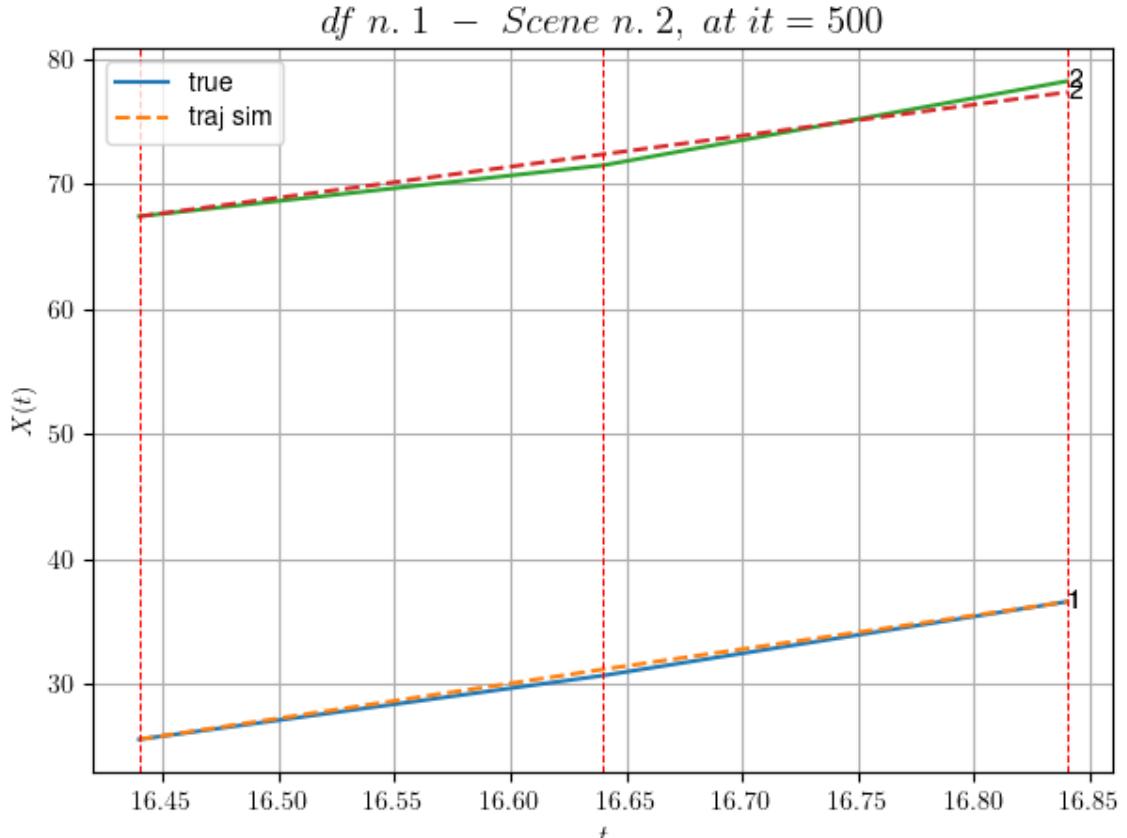


For scene 56/73:

* After LR finder: $LR_{NN}=5e-05$ with $mse=23.500248270574886$
at $it=24$
* $v_0 = 38.923494443015095$
* $MSE = 0.38350992654120586$
* iterations = 500

DataFrame n.1. Scene n.57/73

We have 2 time intervals inside [16.44, 16.84]

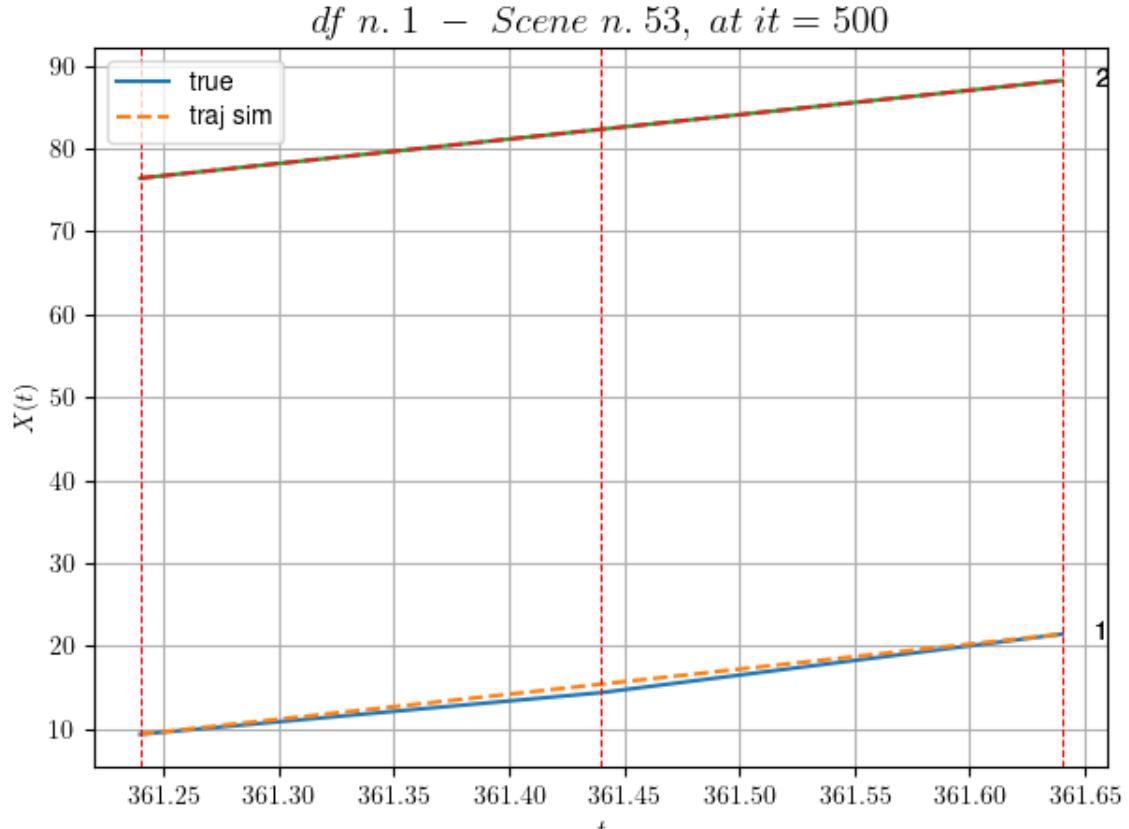


For scene 57/73:

* After LR finder: $LR_NN=5e-05$ with $mse=0.8960817397973612$
at it=24
* $v_0 = 24.81916984009749$
* MSE = 0.27830290977029054
* iterations = 500

DataFrame n.1. Scene n.58/73

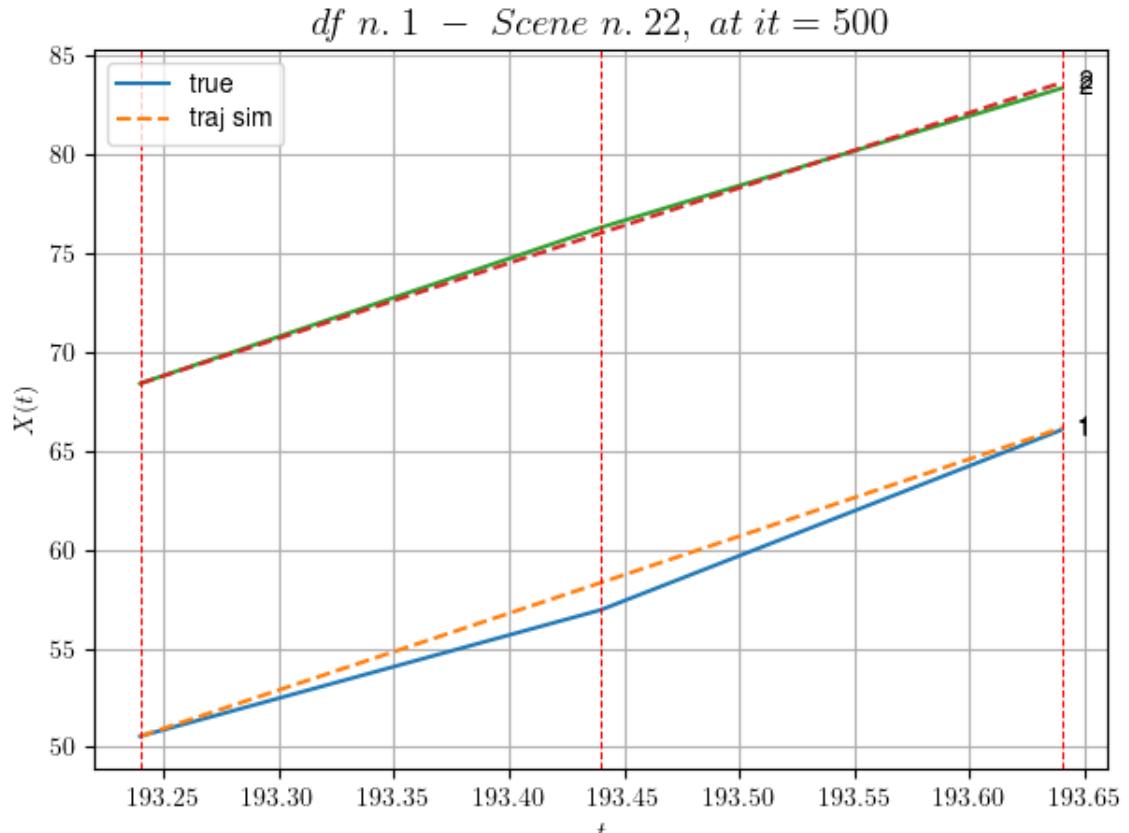
We have 2 time intervals inside [361.24,361.64]



For scene 58/73:
* After LR finder: LR_NN=1e-05 with mse=0.20829550861173826
at it=24
* v0 = 29.453860908621596
* MSE = 0.17249650933925267
* iterations = 500

DataFrame n.1. Scene n.59/73

We have 2 time intervals inside [193.24,193.64]

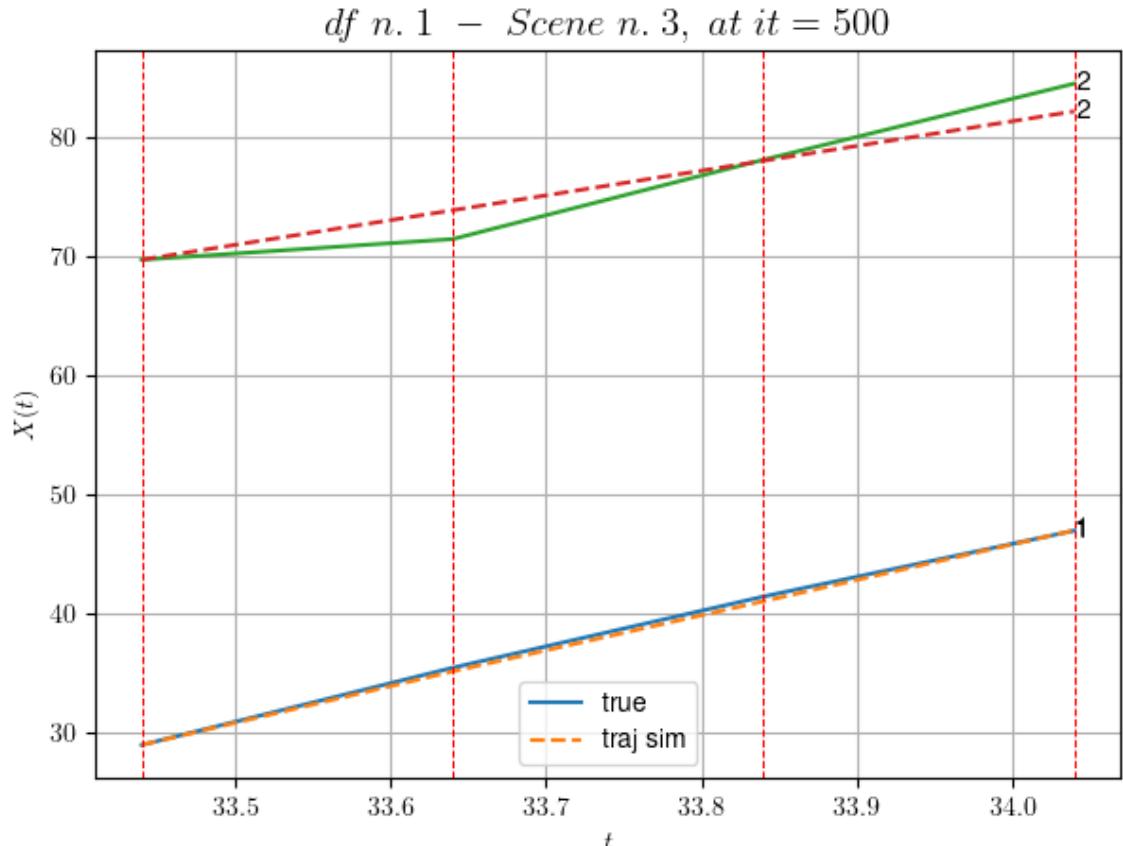


For scene 59/73:

* After LR finder: $\text{LR_NN}=5\text{e-}05$ with $\text{mse}=2.2720775713490347$
at it=24
* $v_0 = 38.08399937691432$
* $\text{MSE} = 0.34403755128098756$
* iterations = 500

DataFrame n.1. Scene n.60/73

We have 3 time intervals inside [33.44,34.04]

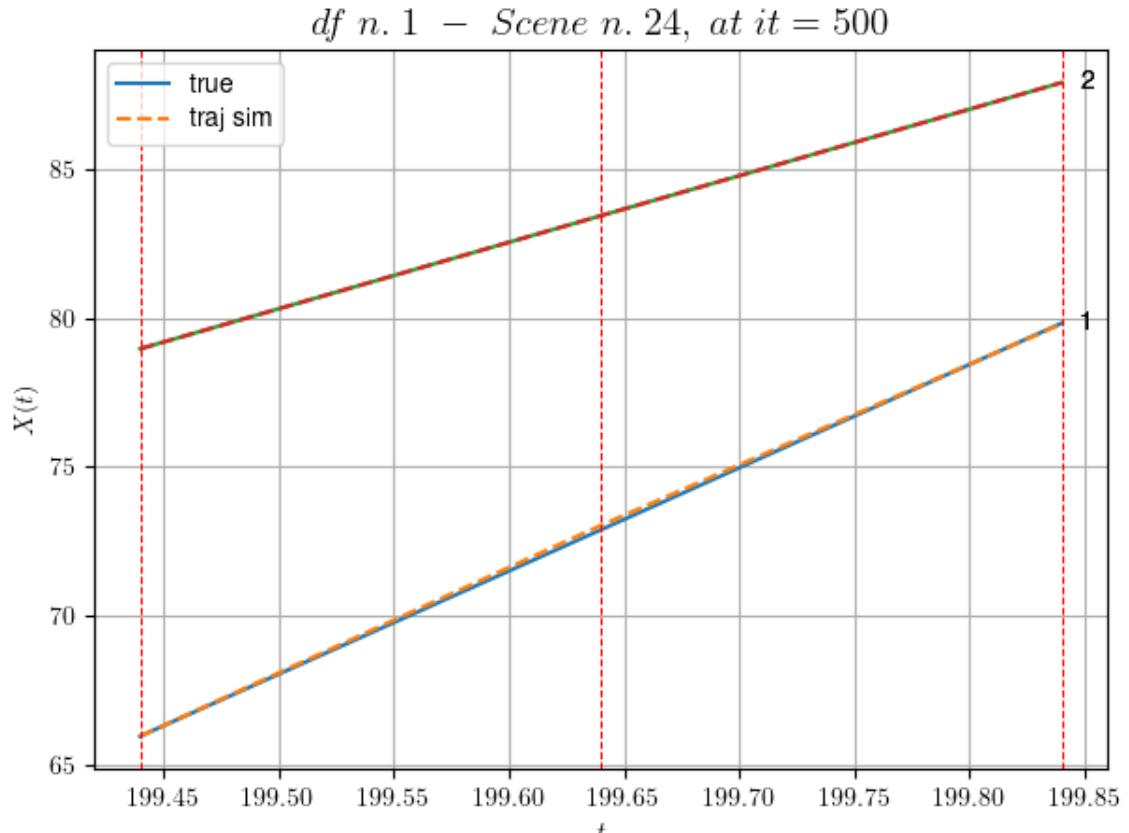


For scene 60/73:

* After LR finder: LR_NN=5e-05 with mse=5.233479387855655 at it=24
* $v_0 = 20.735623985237968$
* MSE = 1.2798406048082387
* iterations = 500

DataFrame n.1. Scene n.61/73

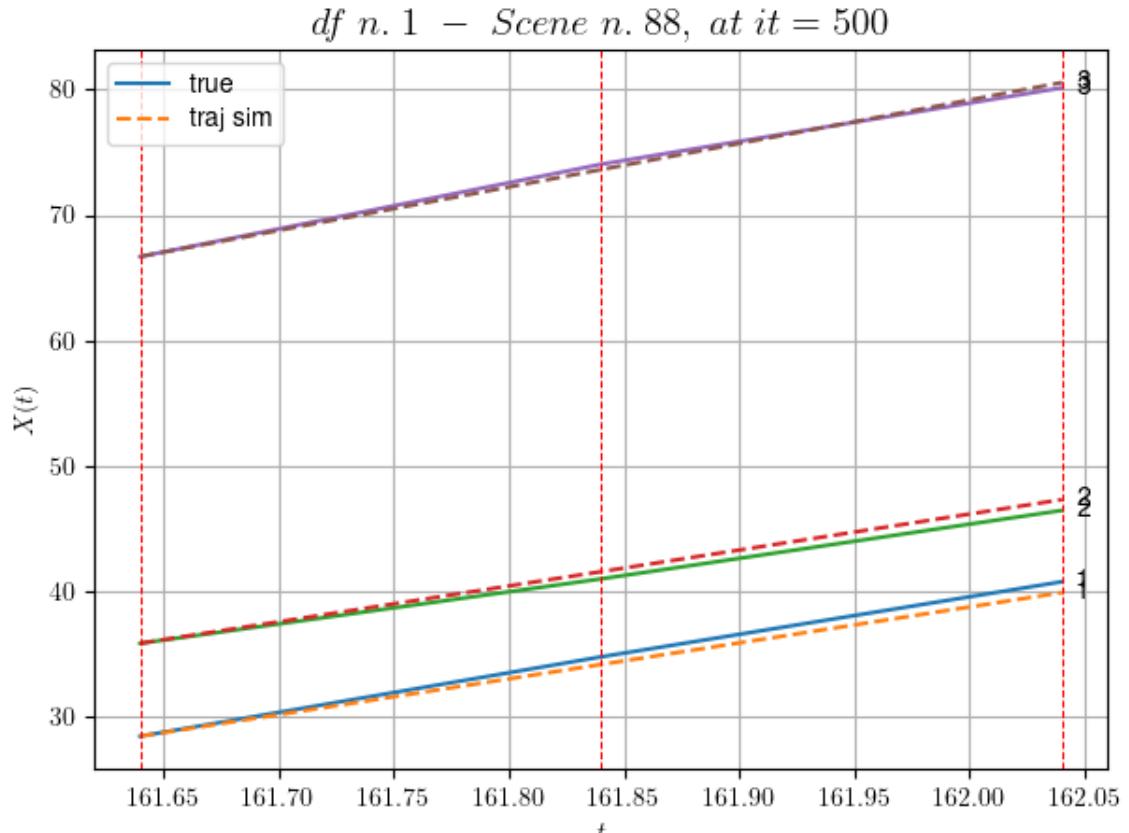
We have 2 time intervals inside [199.44,199.84]



For scene 61/73:
* After LR finder: LR_NN=0.0001 with mse=2.0179003342069963
at it=24
* v0 = 22.40301272986073
* MSE = 0.003722406378521104
* iterations = 500

DataFrame n.1. Scene n.62/73

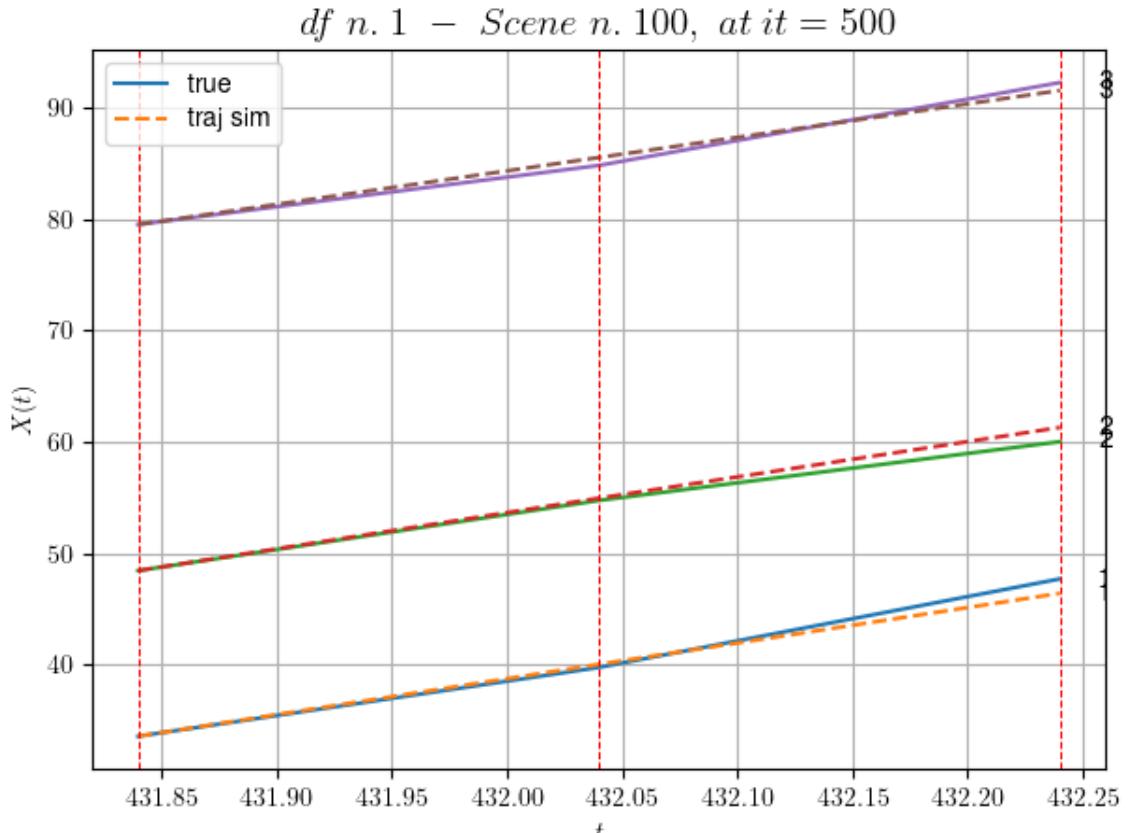
We have 2 time intervals inside [161.64, 162.04]



For scene 62/73:
* After LR finder: $\text{LR_NN}=5\text{e-}05$ with $\text{mse}=14.231681679284556$
at it=24
* $v_0 = 34.711815198035865$
* MSE = 0.28305648174271675
* iterations = 500

DataFrame n.1. Scene n.63/73

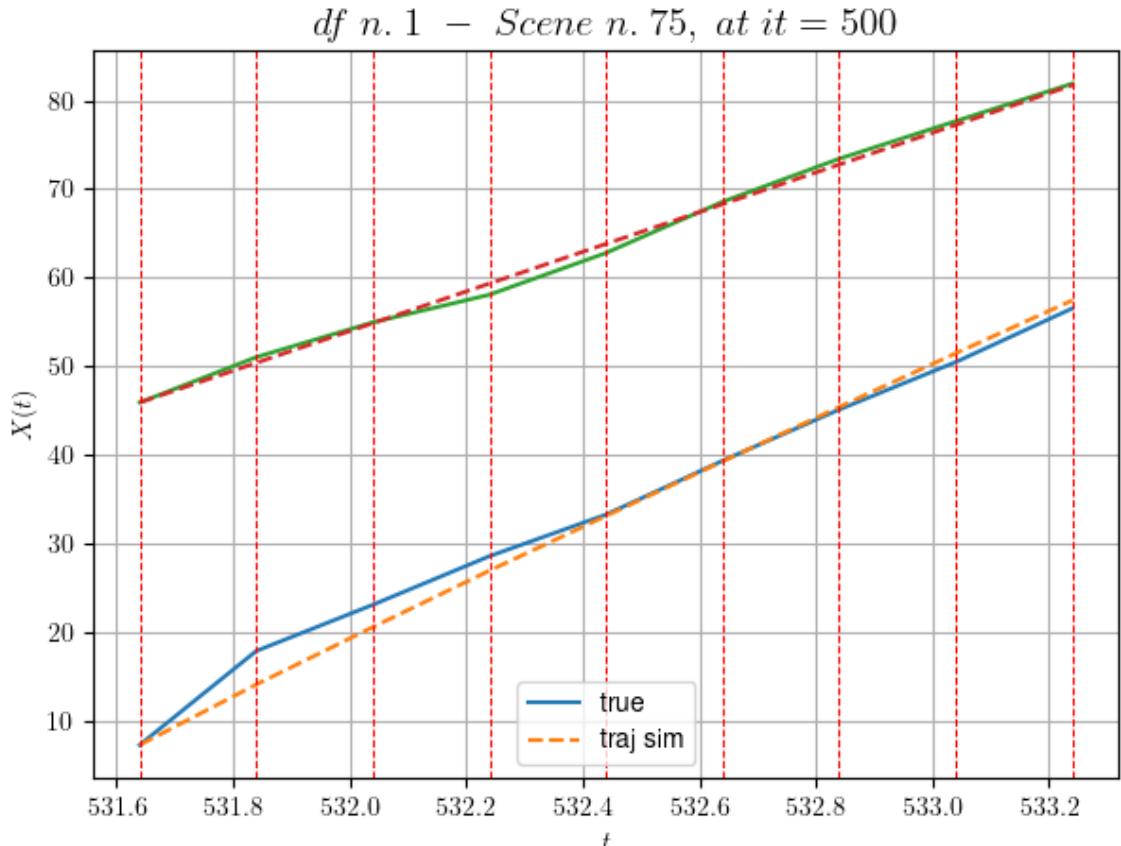
We have 2 time intervals inside [431.84, 432.24]



For scene 63/73:
* After LR finder: LR_NN=0.0001 with mse=7.429781692576643
at it=24
* $v_0 = 30.08416163618794$
* MSE = 0.4934710224295175
* iterations = 500

DataFrame n.1. Scene n.64/73

We have 8 time intervals inside [531.64, 533.24]

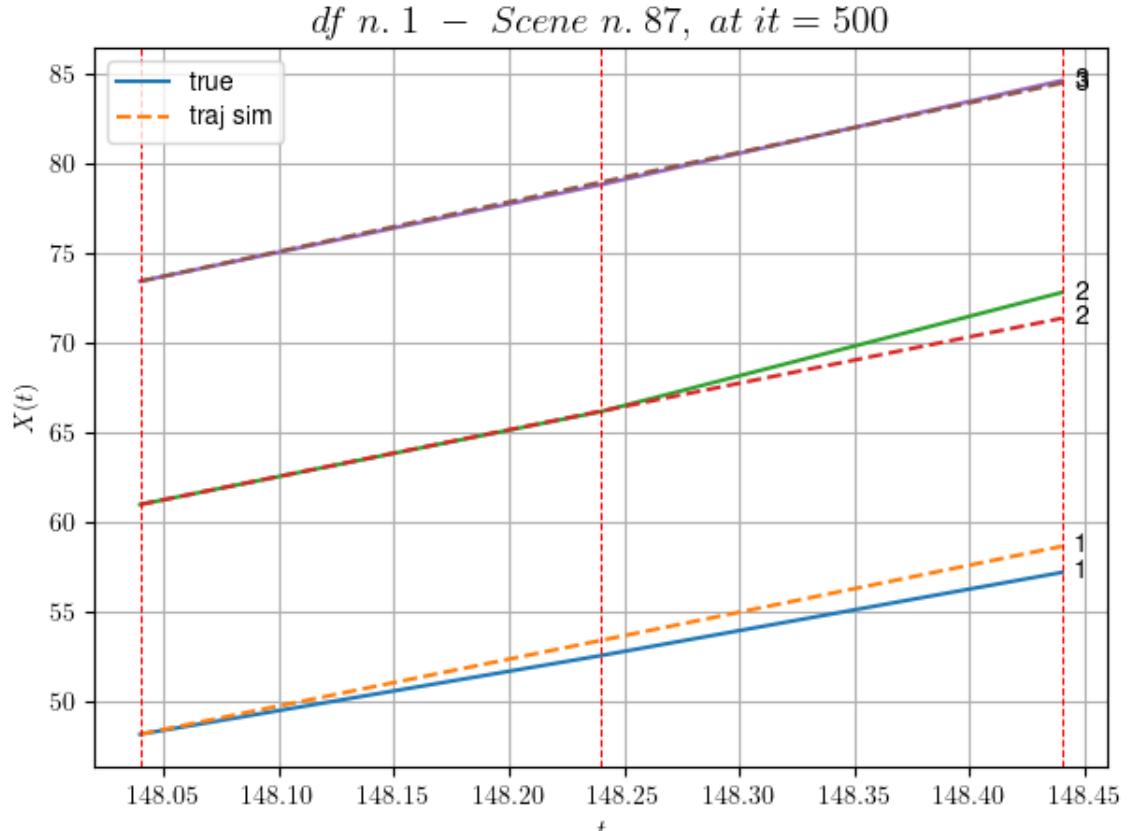


For scene 64/73:

* After LR finder: LR_NN=1e-05 with mse=26.76904362805493 at it=24
* $v_0 = 22.38264840590285$
* MSE = 1.6121087532030747
* iterations = 500

DataFrame n.1. Scene n.65/73

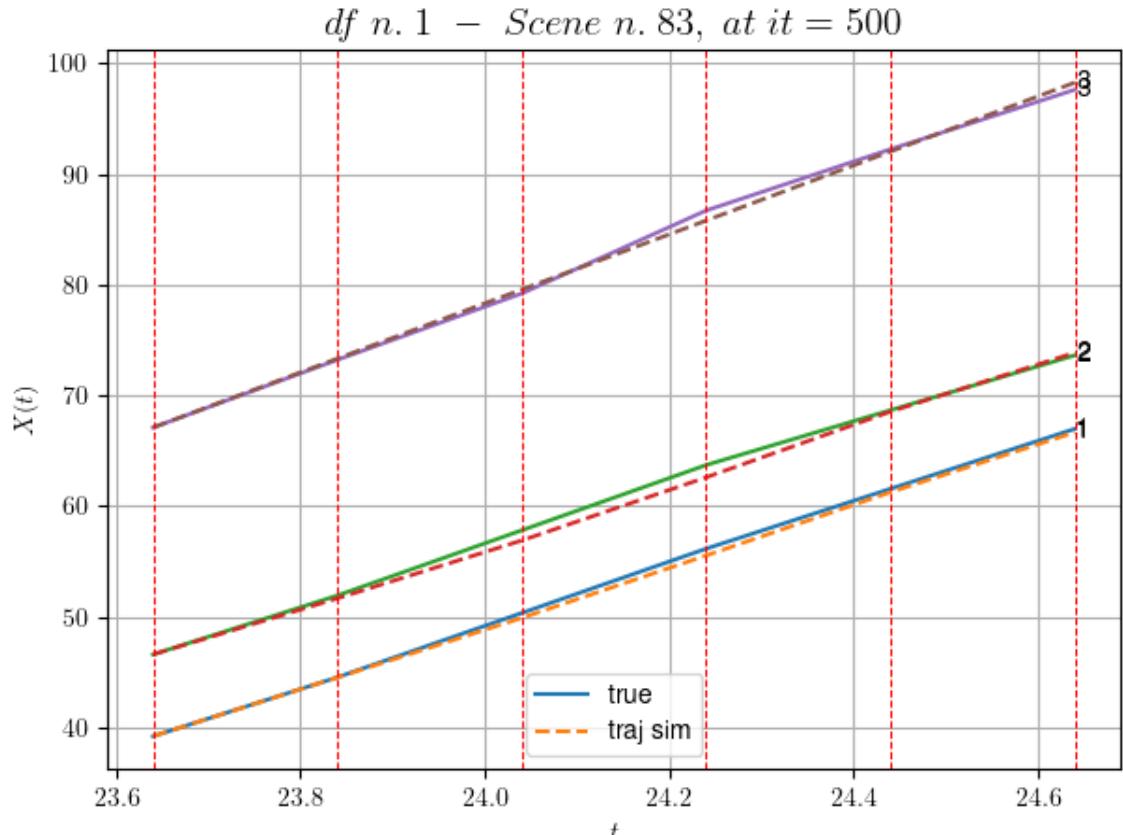
We have 2 time intervals inside [148.04,148.44]



For scene 65/73:
* After LR finder: LR_NN=0.0001 with mse=0.8205847338712107
at it=24
* v0 = 27.621656721215896
* MSE = 0.5306736430964752
* iterations = 500

DataFrame n.1. Scene n.66/73

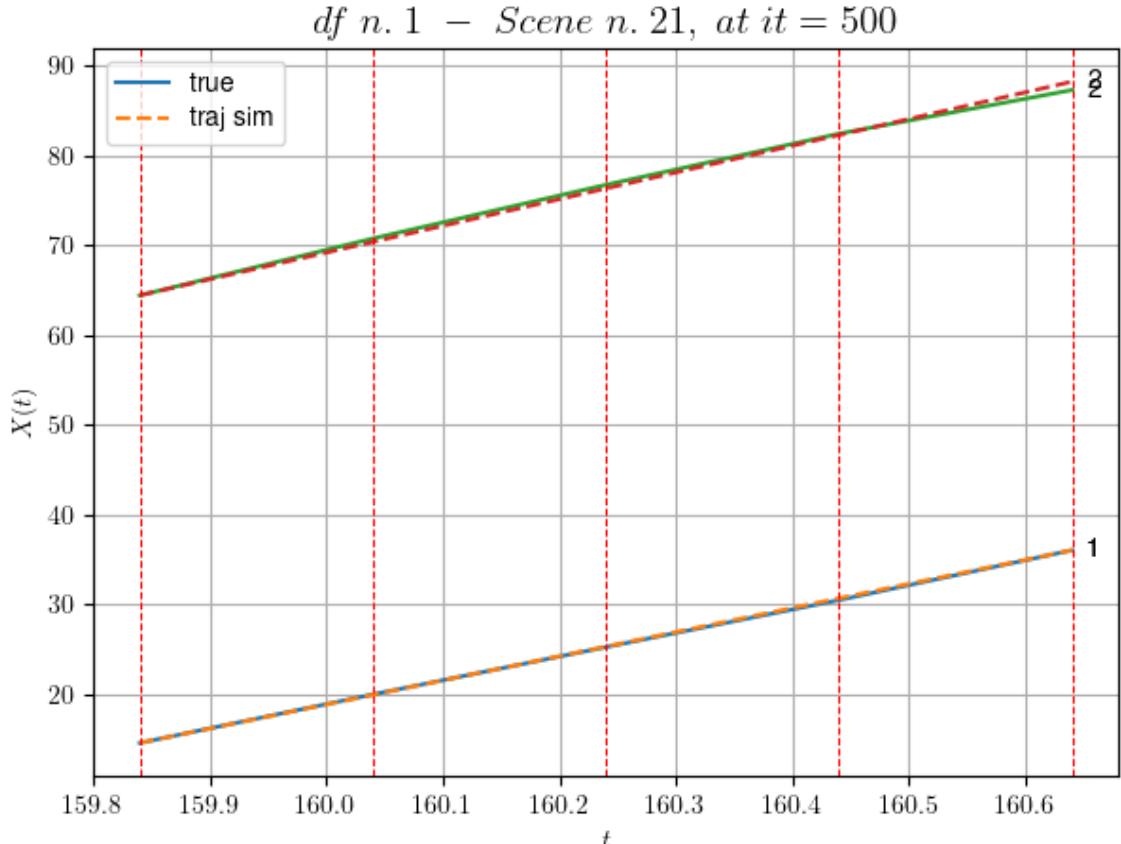
We have 5 time intervals inside [23.64, 24.64]



For scene 66/73:
* After LR finder: LR_NN=0.001 with mse=28.440975050903074
at it=24
* v0 = 31.184420565840117
* MSE = 0.15642184478234064
* iterations = 500

DataFrame n.1. Scene n.67/73

We have 4 time intervals inside [159.84, 160.64]

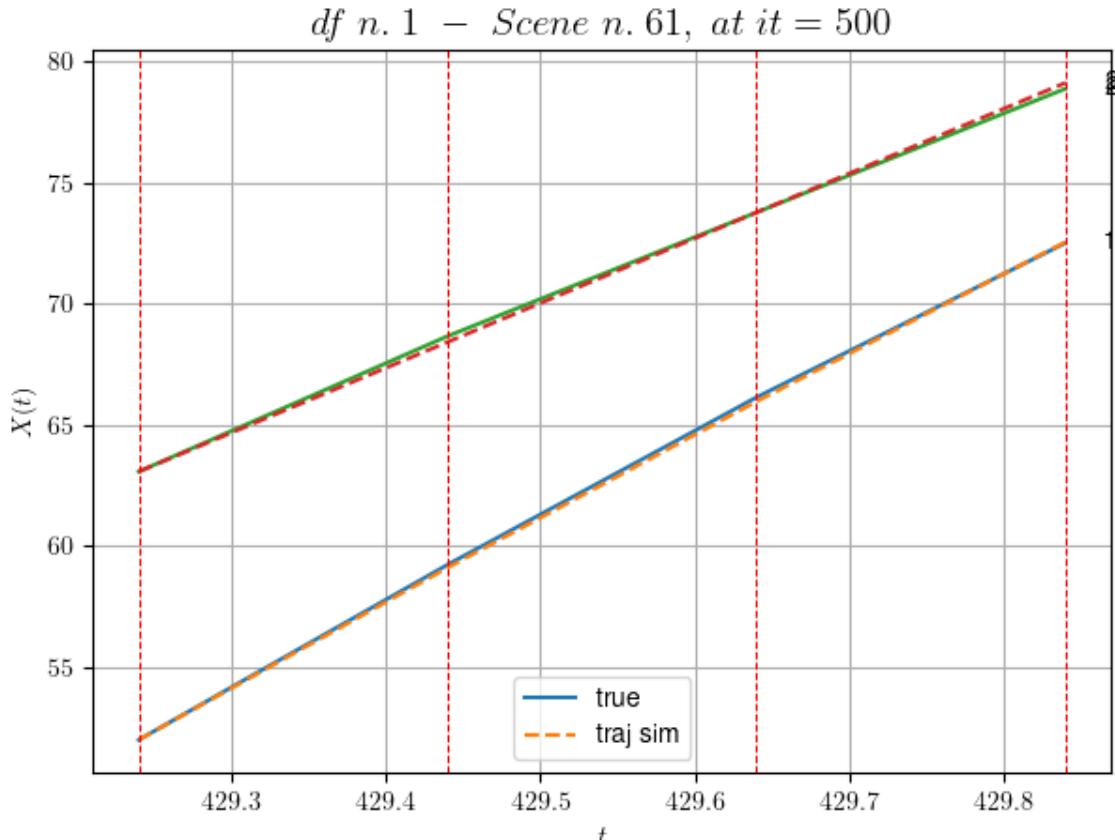


For scene 67/73:

* After LR finder: LR_NN=5e-05 with mse=0.1479358040007072
at it=24
* v0 = 29.79906541567449
* MSE = 0.12613731284308008
* iterations = 500

DataFrame n.1. Scene n.68/73

We have 3 time intervals inside [429.24,429.84]

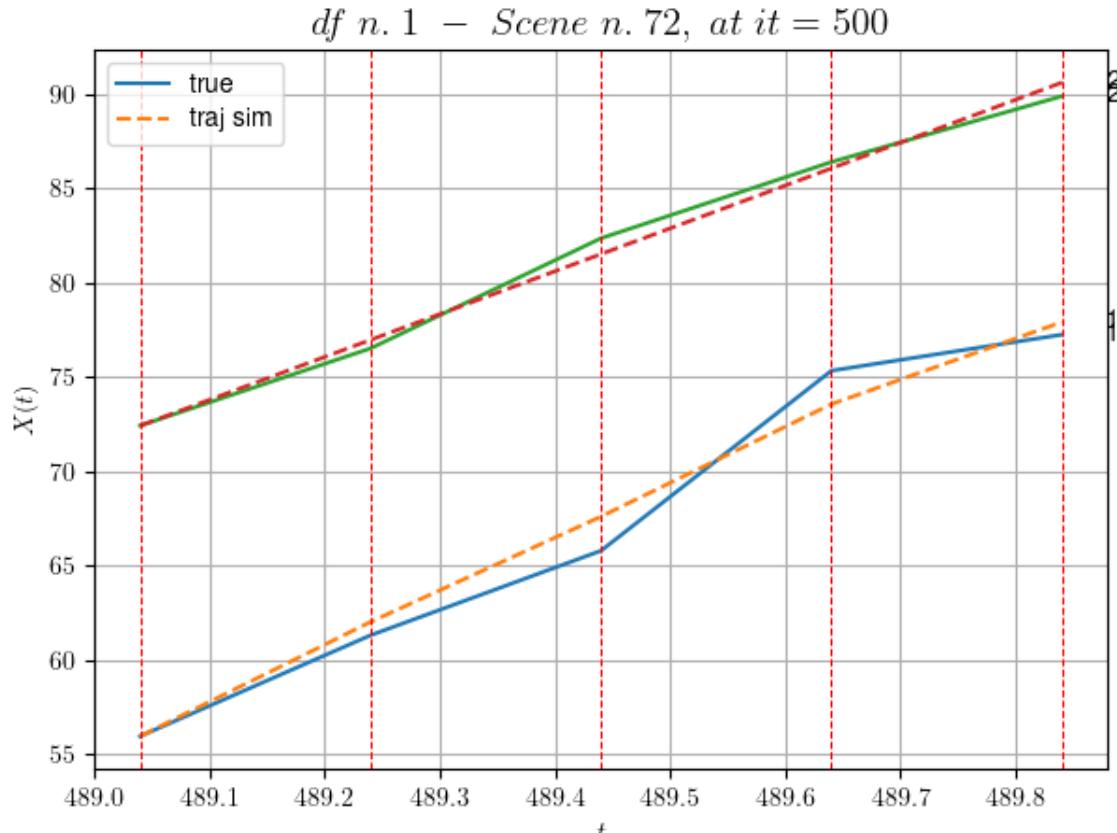


For scene 68/73:

* After LR finder: LR_NN=0.0001 with mse=0.9326321425005917
at it=24
* v0 = 26.764923514729247
* MSE = 0.020500497575636226
* iterations = 500

DataFrame n.1. Scene n.69/73

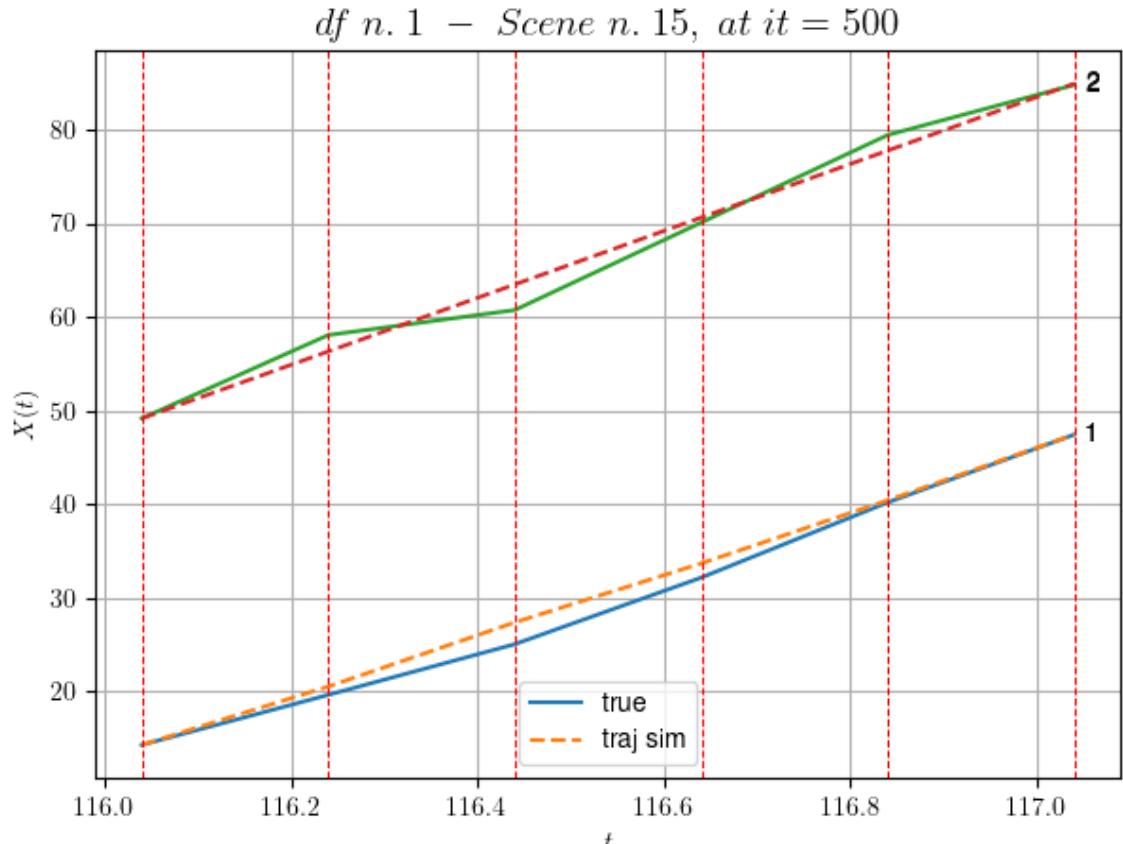
We have 4 time intervals inside [489.04, 489.84]



For scene 69/73:
* After LR finder: LR_NN=5e-05 with mse=7.439119913192912 at it=24
* v0 = 22.729734196719
* MSE = 0.8914338893509466
* iterations = 500

DataFrame n.1. Scene n.70/73

We have 5 time intervals inside [116.04,117.04]

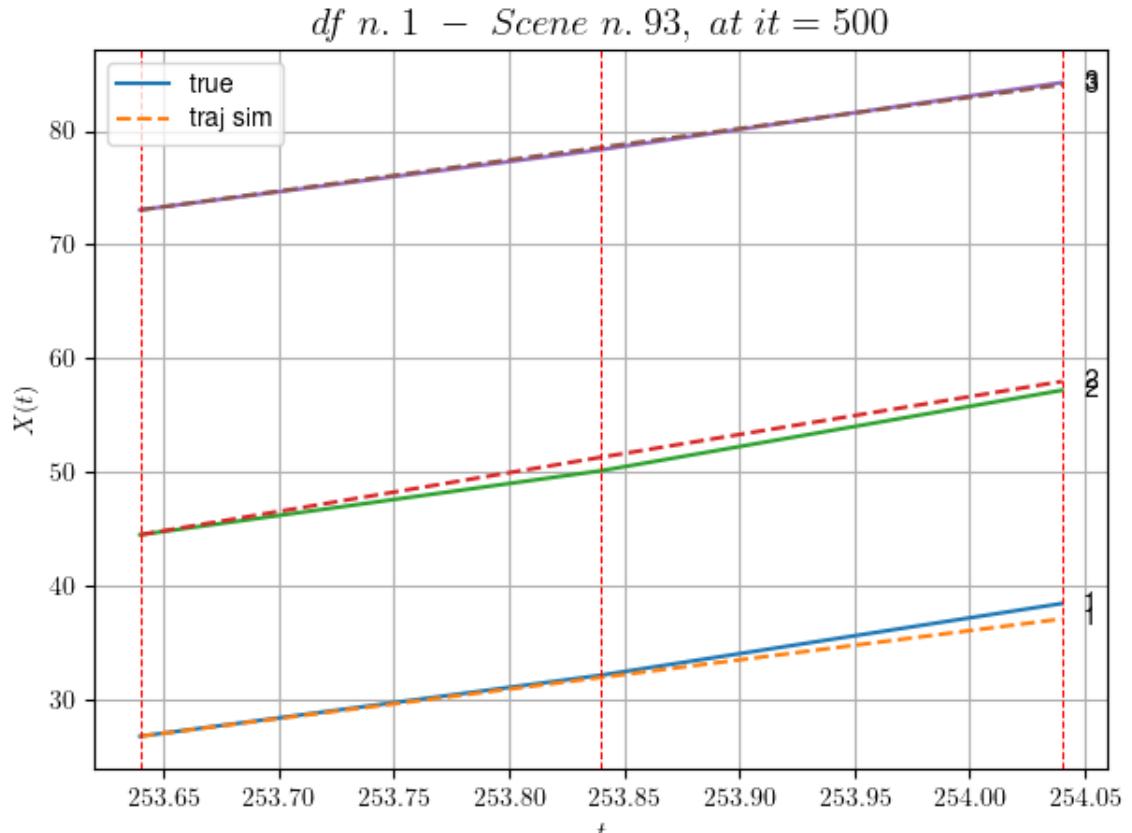


For scene 70/73:

* After LR finder: LR_NN=1e-05 with mse=7.935705920261117 at it=24
* v0 = 35.754459494761576
* MSE = 1.8392171436371758
* iterations = 500

DataFrame n.1. Scene n.71/73

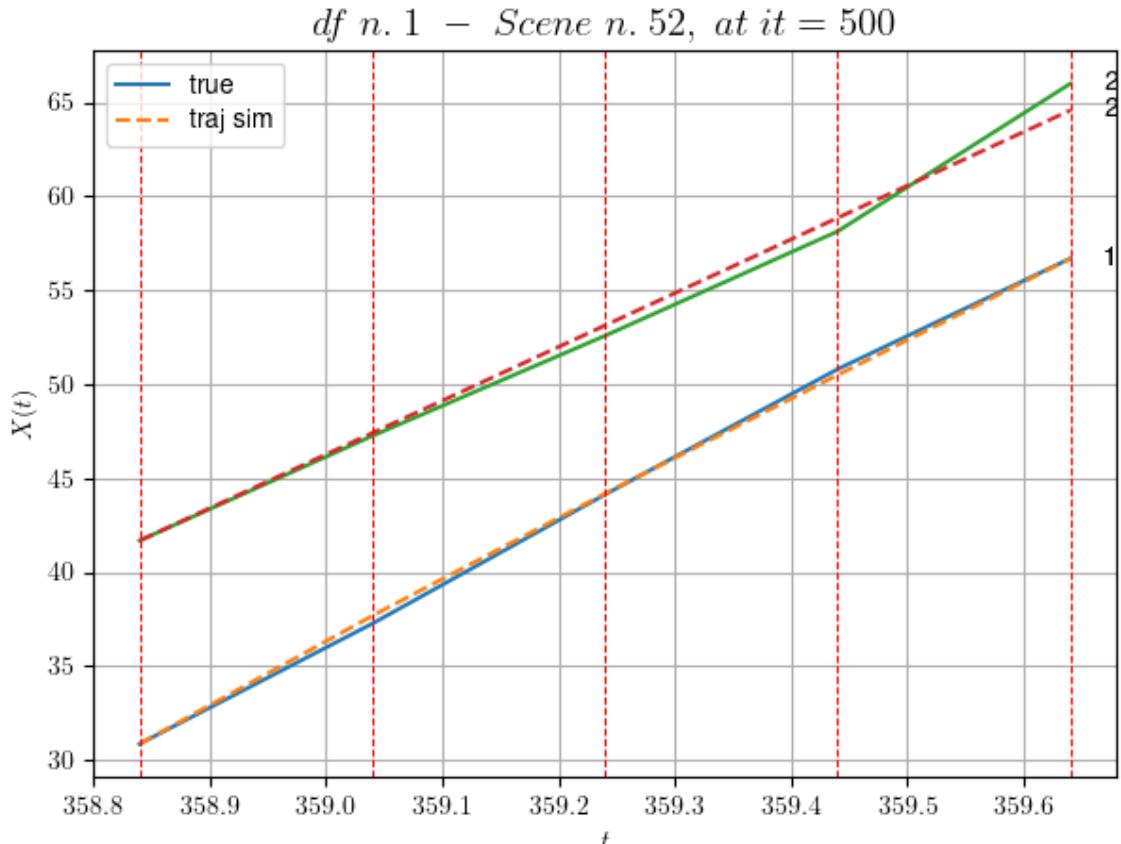
We have 2 time intervals inside [253.64, 254.04]



For scene 71/73:
* After LR finder: LR_NN=5e-05 with mse=1.6411418071813368
at it=24
* v0 = 27.474879582348784
* MSE = 0.440656448786324
* iterations = 500

DataFrame n.1. Scene n.72/73

We have 4 time intervals inside [358.84,359.64]

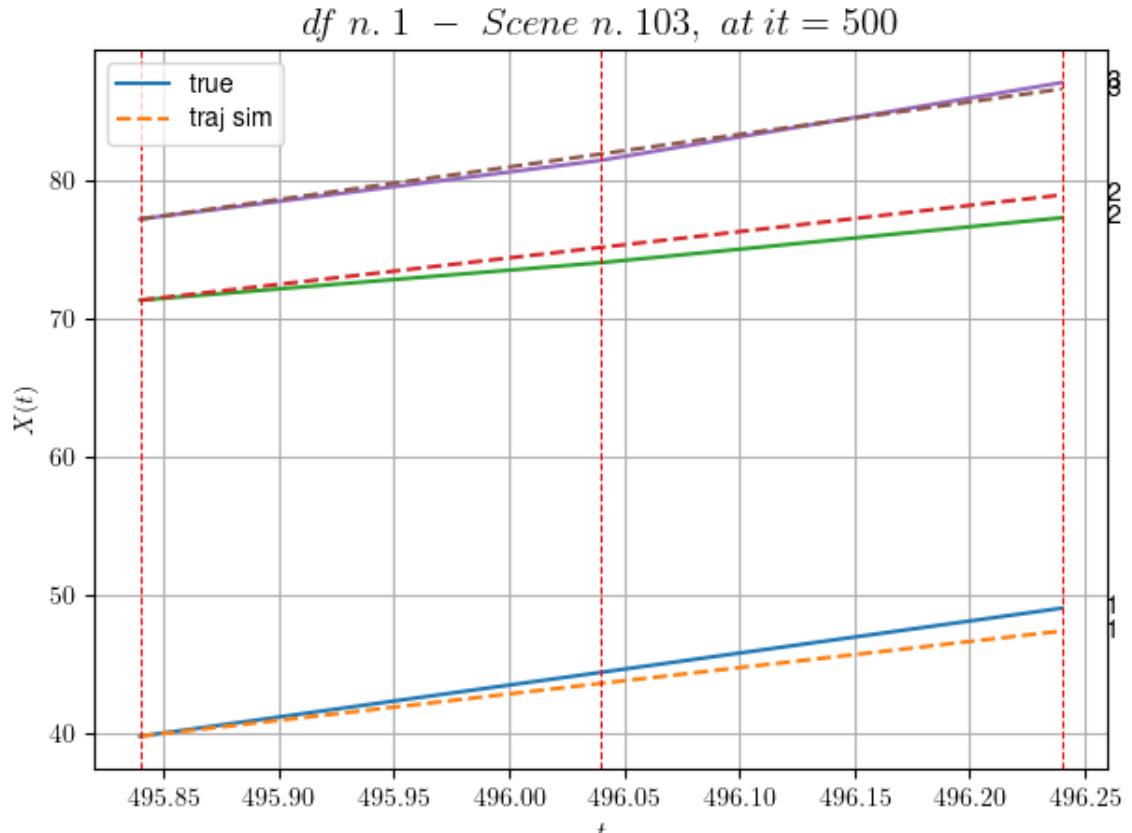


For scene 72/73:

* After LR finder: LR_NN=0.0005 with mse=0.7488192079535759
at it=24
* v0 = 28.626441976920056
* MSE = 0.3126125641024932
* iterations = 500

DataFrame n.1. Scene n.73/73

We have 2 time intervals inside [495.84,496.24]



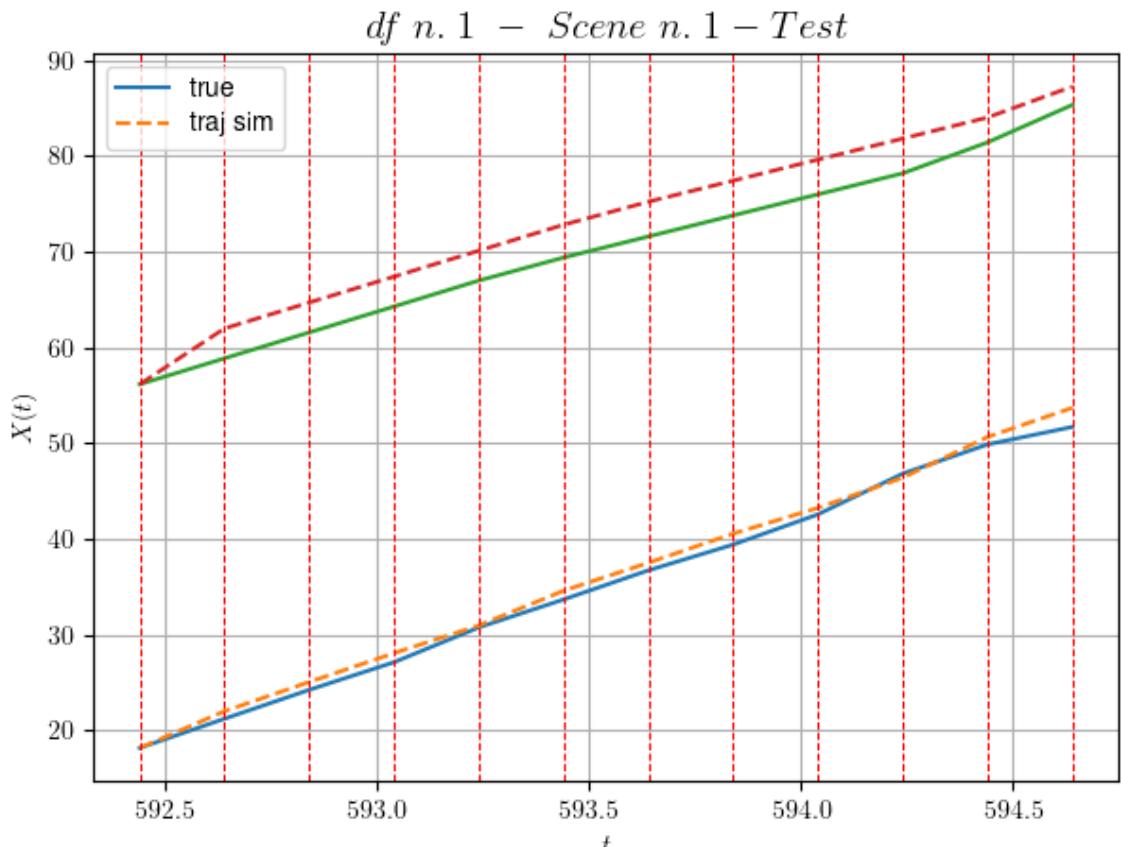
For scene 73/73:
* After LR finder: LR_NN=0.0001 with mse=2.6049347029178924
at it=24
* v0 = 23.56309349087114
* MSE = 0.8615238803441027
* iterations = 500

MSE train: 0.5658022405085427

Testing step. (36 scenes)

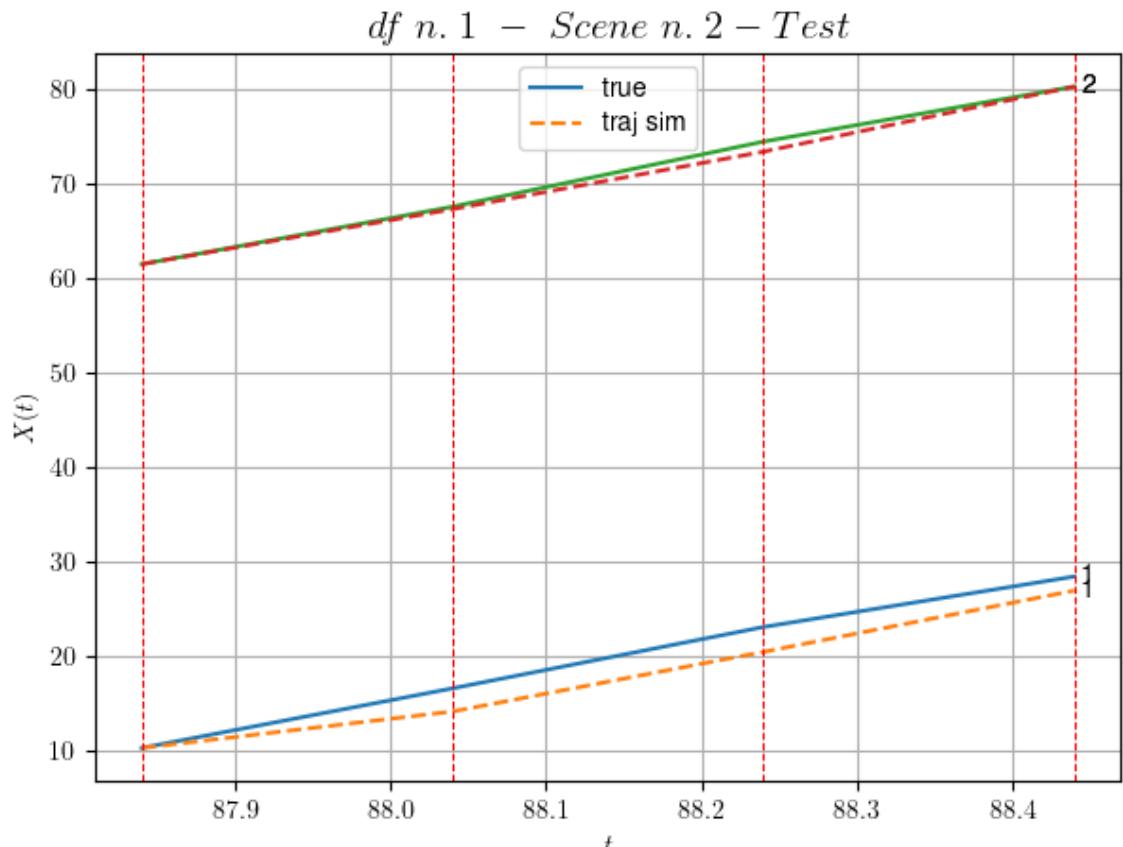
=====

DataFrame n.1. Scene n.1/36



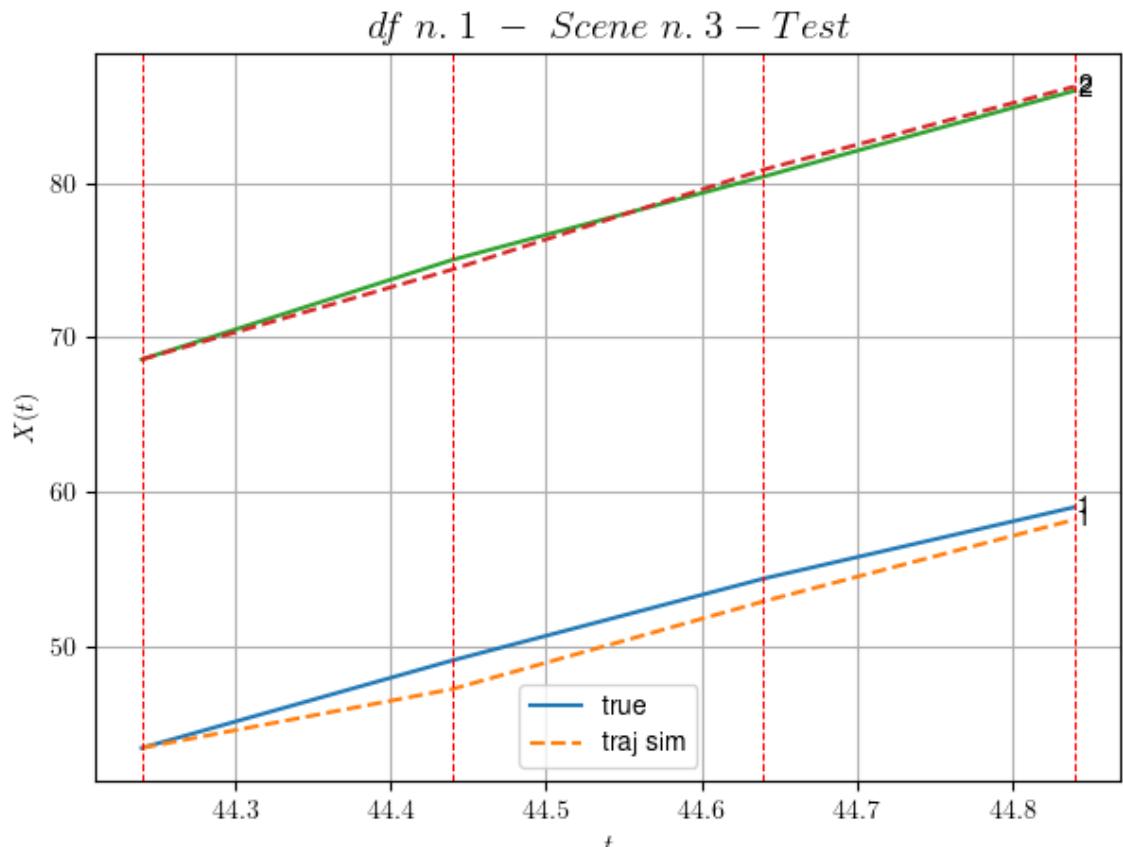
For scene 1/36:
* MSE = 5.169686362285878

DataFrame n.1. Scene n.2/36



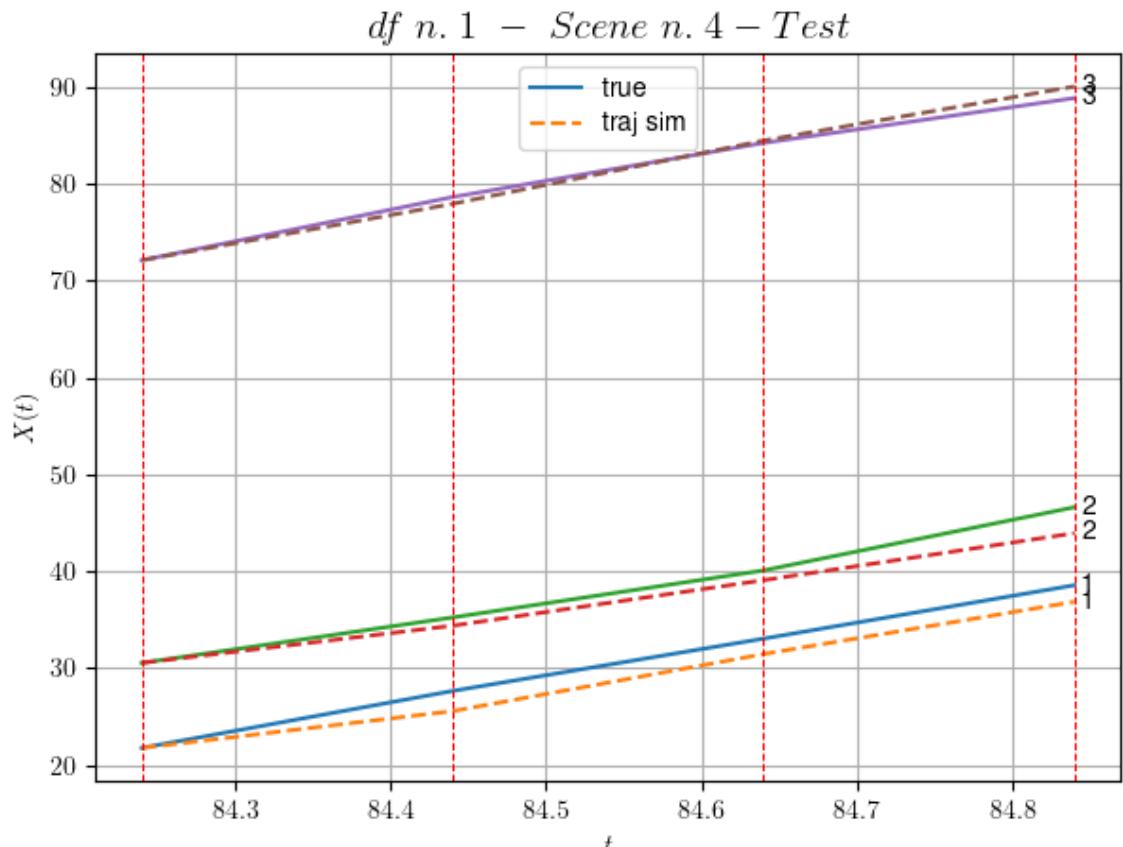
For scene 2/36:
* MSE = 2.0500051908411376

DataFrame n.1. Scene n.3/36



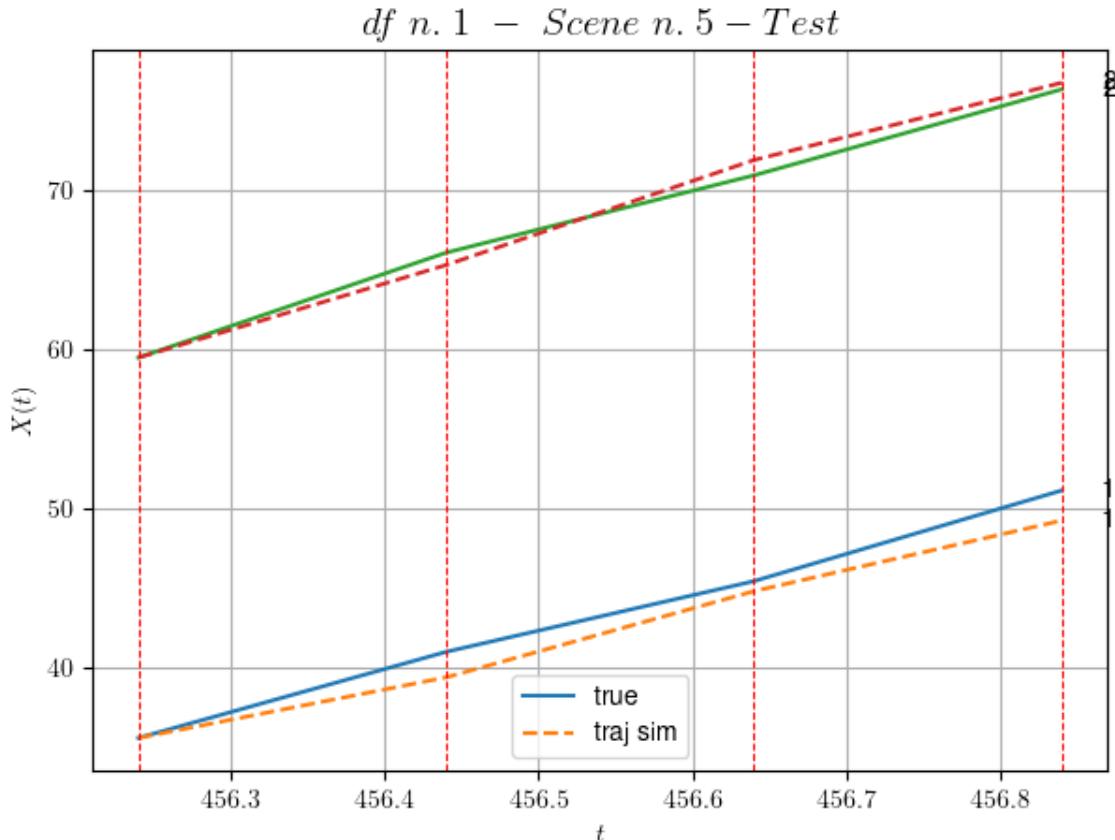
For scene 3/36:
* MSE = 0.8650640732786449

DataFrame n.1. Scene n.4/36



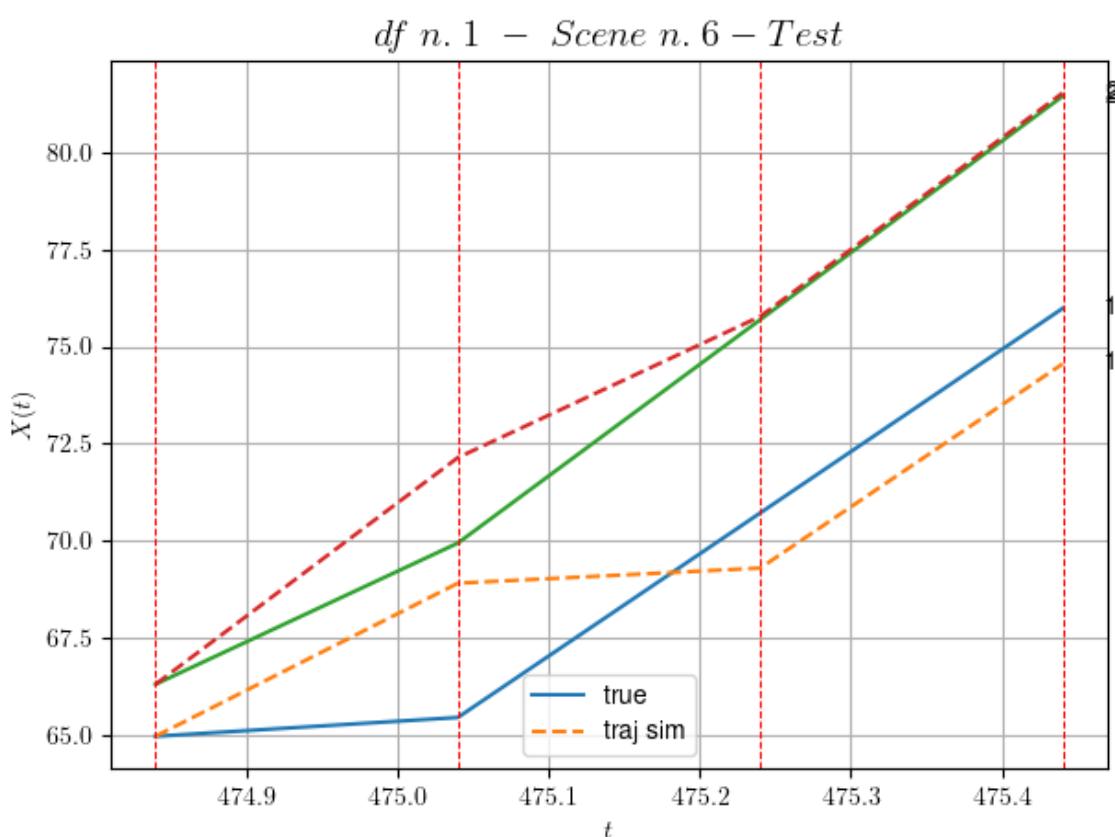
For scene 4/36:
* MSE = 1.7252773646302453

DataFrame n.1. Scene n.5/36



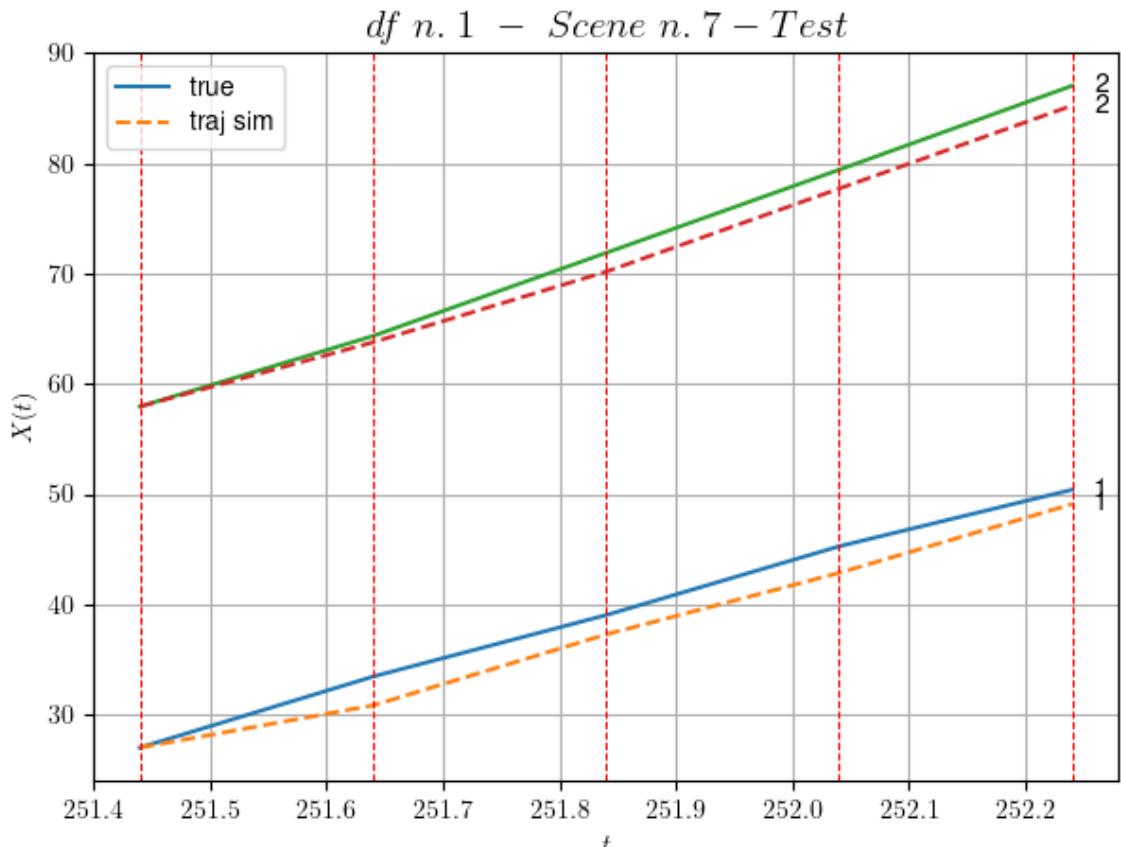
For scene 5/36:
* MSE = 1.033161842508228

DataFrame n.1. Scene n.6/36



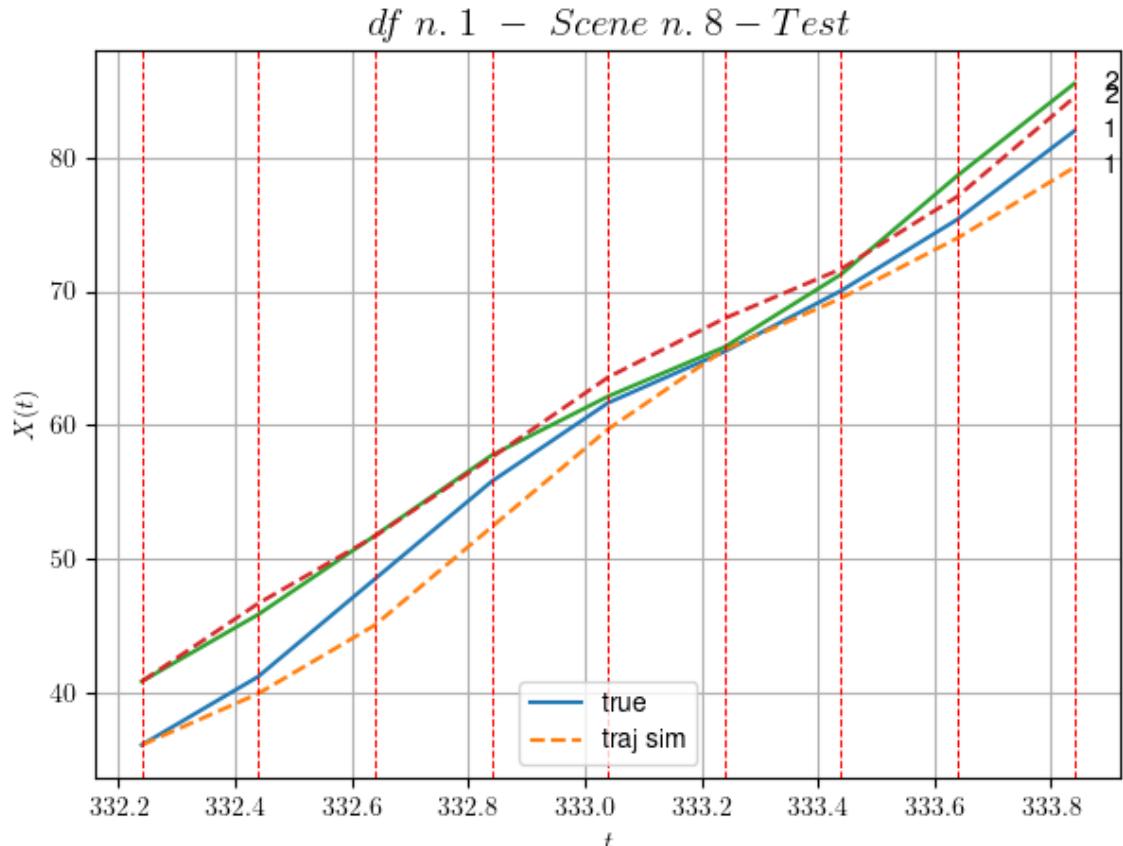
For scene 6/36:
* MSE = 2.6016720583349313

DataFrame n.1. Scene n.7/36



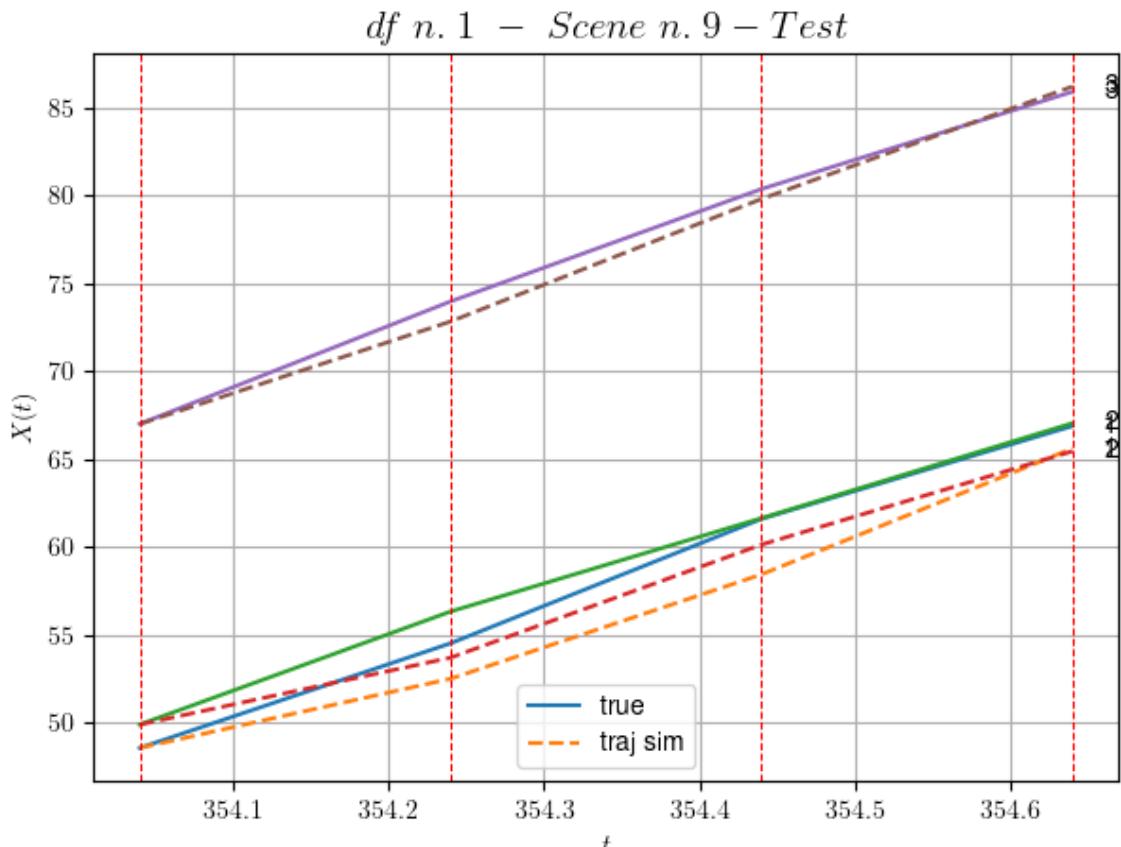
For scene 7/36:
* MSE = 2.6821840547338405

DataFrame n.1. Scene n.8/36



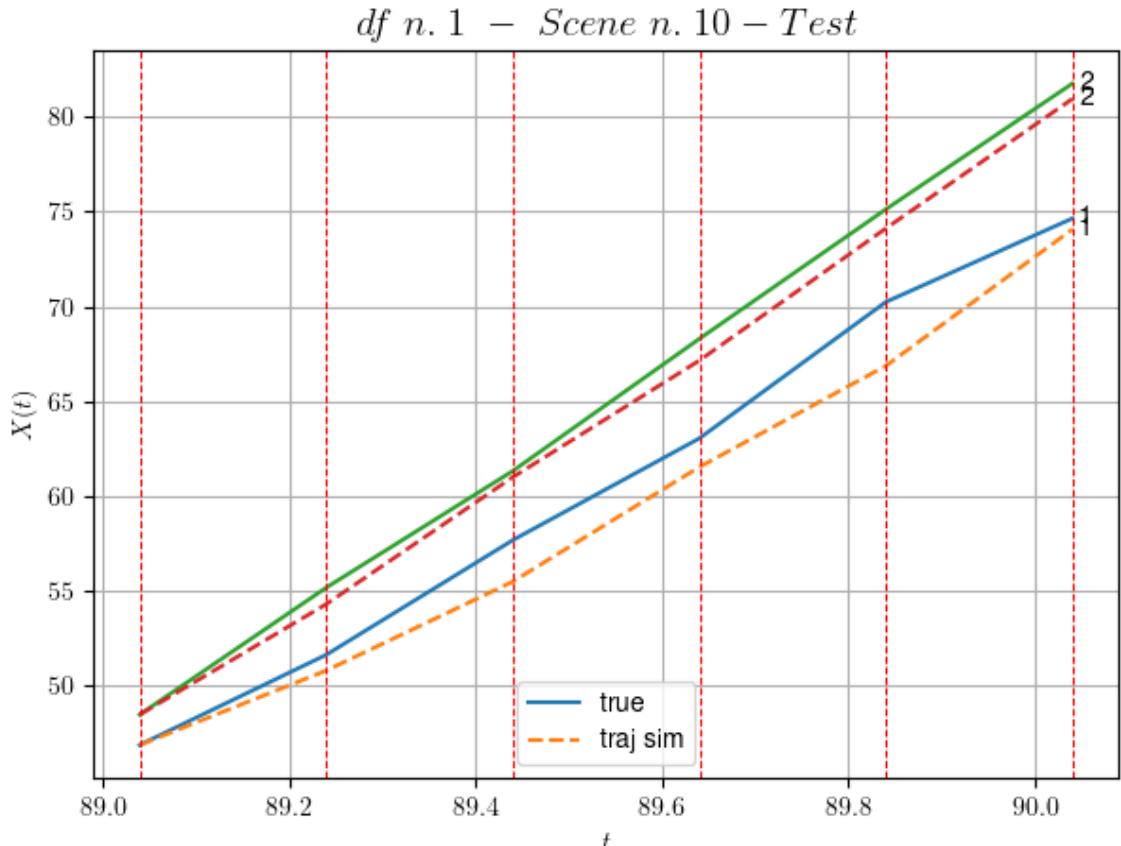
For scene 8/36:
* MSE = 2.753660281776589

DataFrame n.1. Scene n.9/36



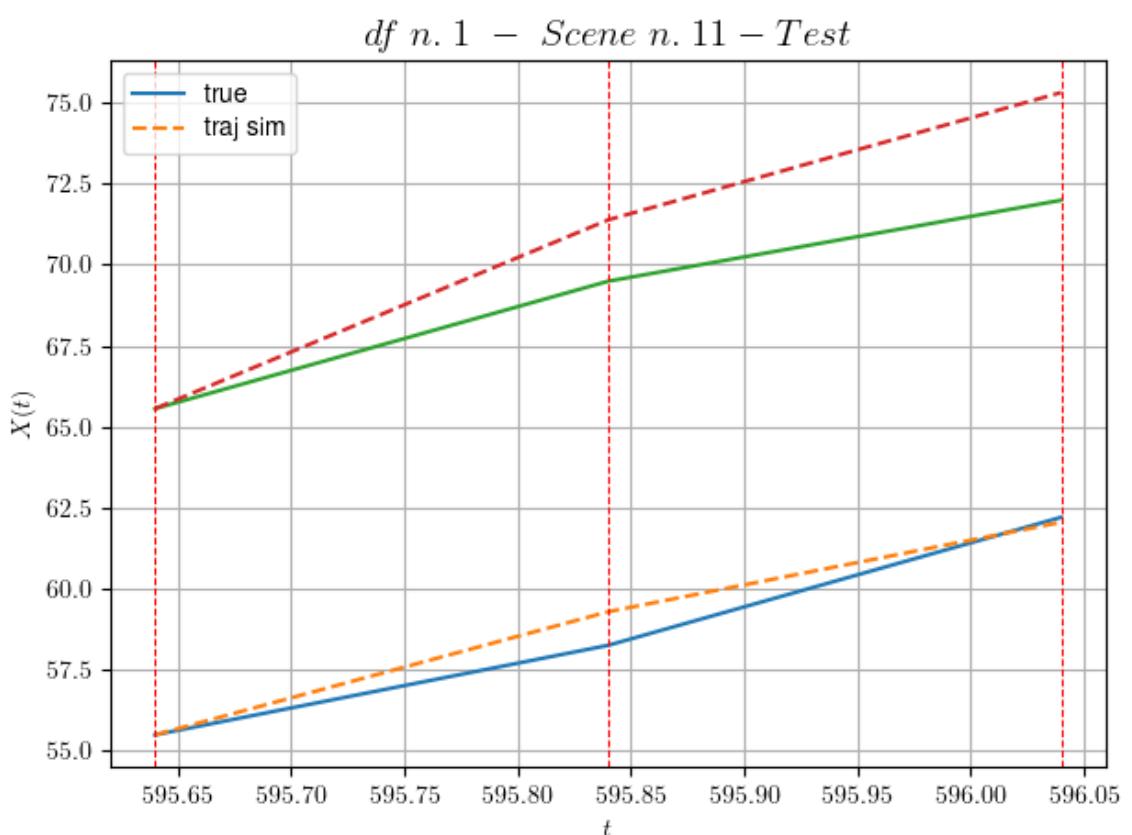
For scene 9/36:
* MSE = 2.423212628625578

DataFrame n.1. Scene n.10/36



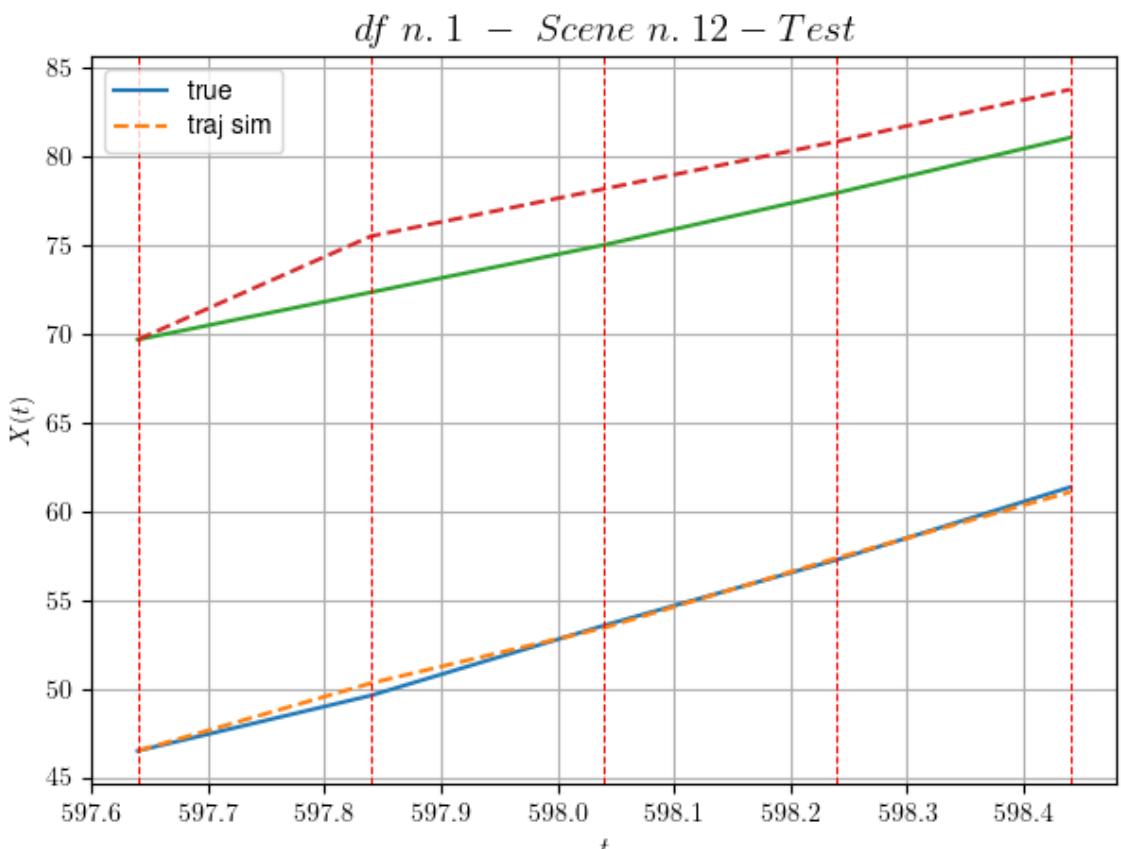
For scene 10/36:
* MSE = 1.9423381440429908

DataFrame n.1. Scene n.11/36



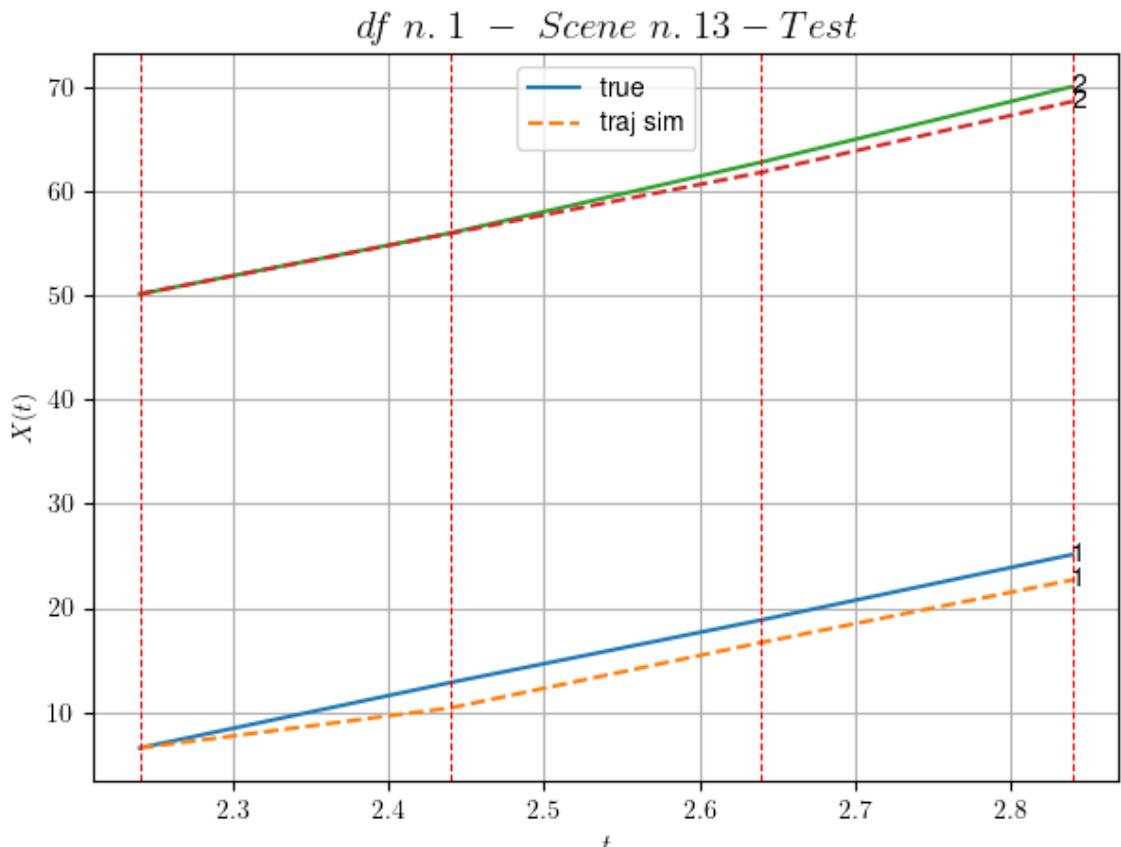
For scene 11/36:
* MSE = 2.627339619582349

DataFrame n.1. Scene n.12/36



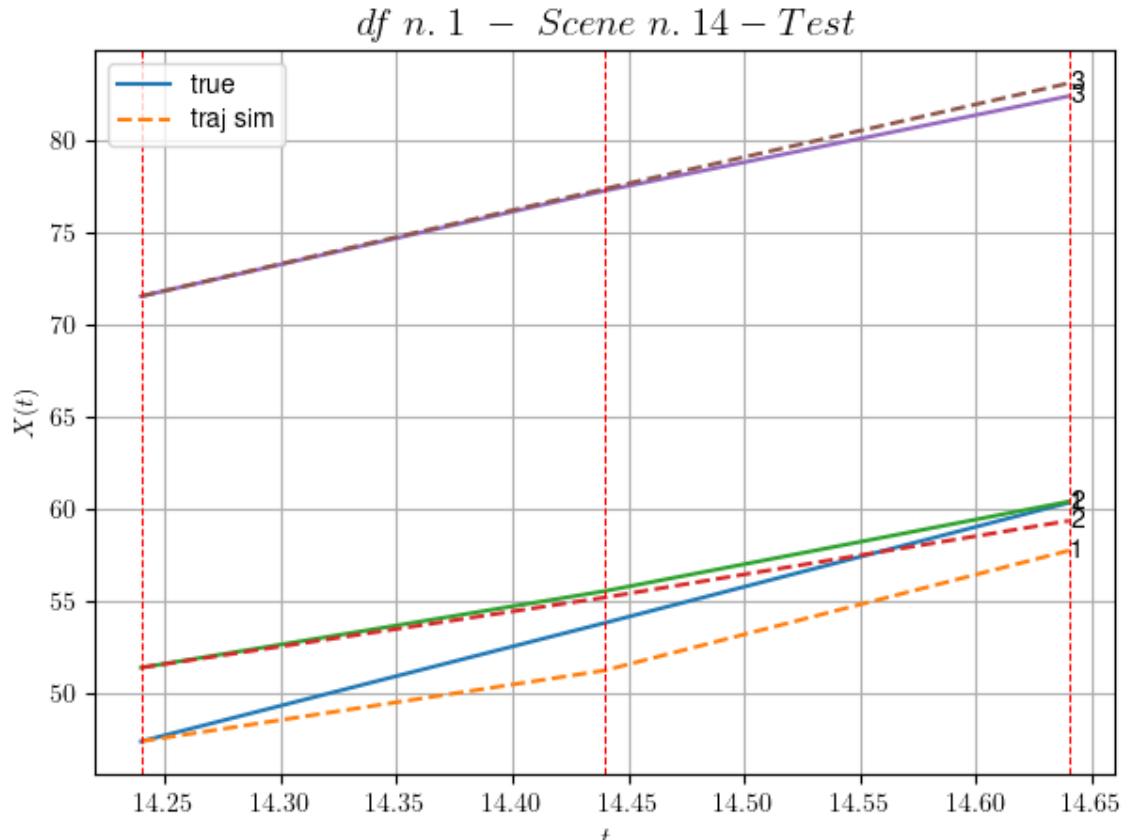
For scene 12/36:
* MSE = 3.628652805489101

DataFrame n.1. Scene n.13/36



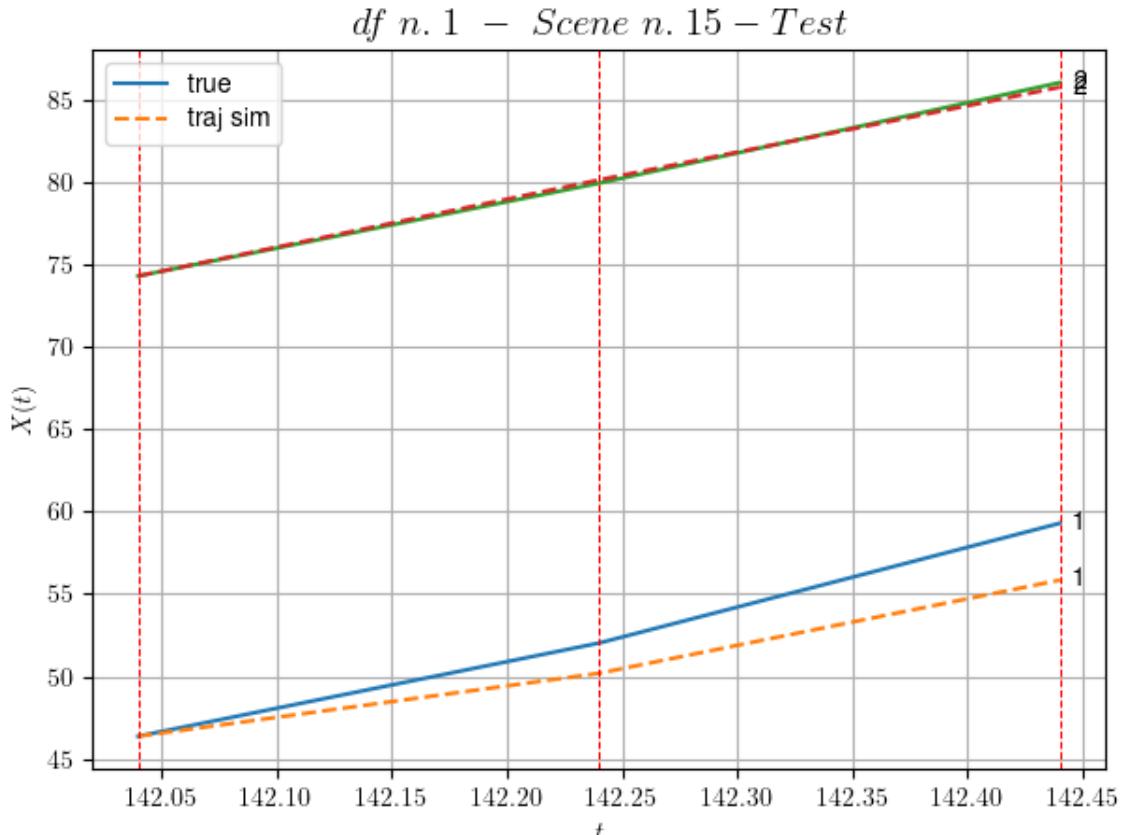
For scene 13/36:
* MSE = 2.4556388410573864

DataFrame n.1. Scene n.14/36



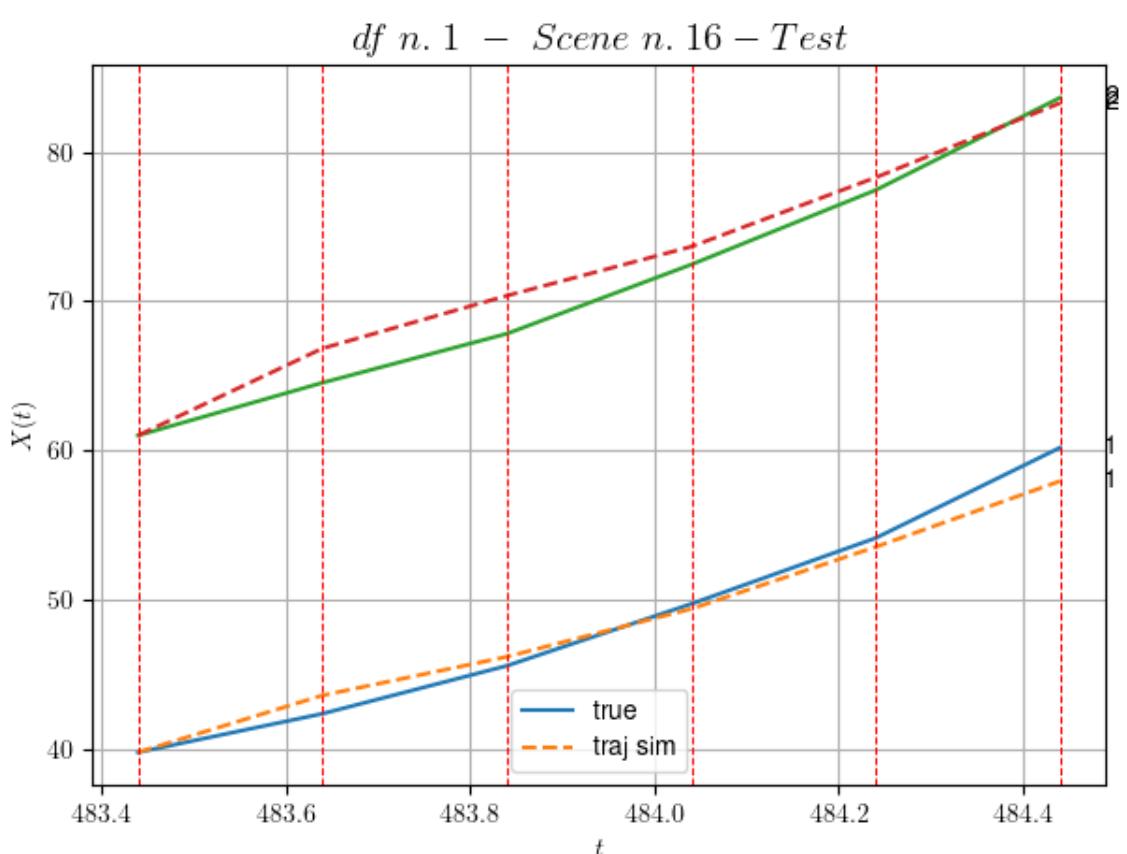
For scene 14/36:
* MSE = 1.67471728546748

DataFrame n.1. Scene n.15/36



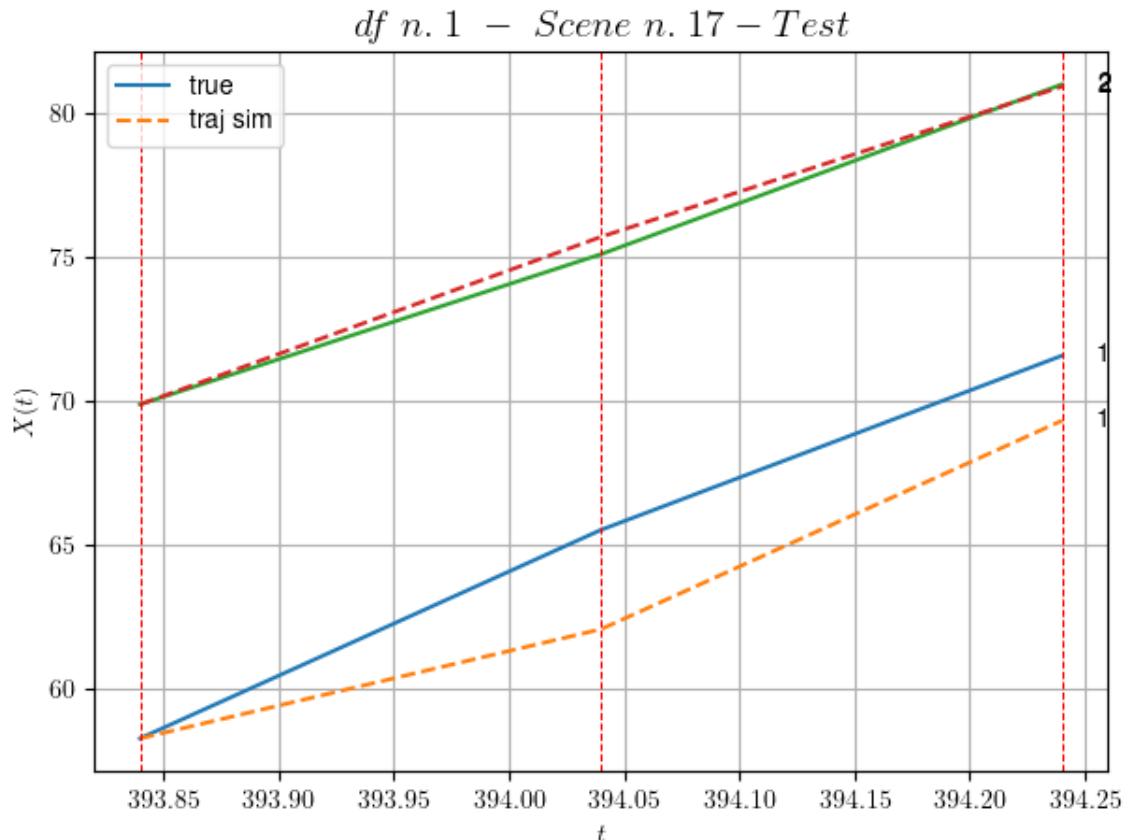
For scene 15/36:
* MSE = 2.5655007923148934

DataFrame n.1. Scene n.16/36



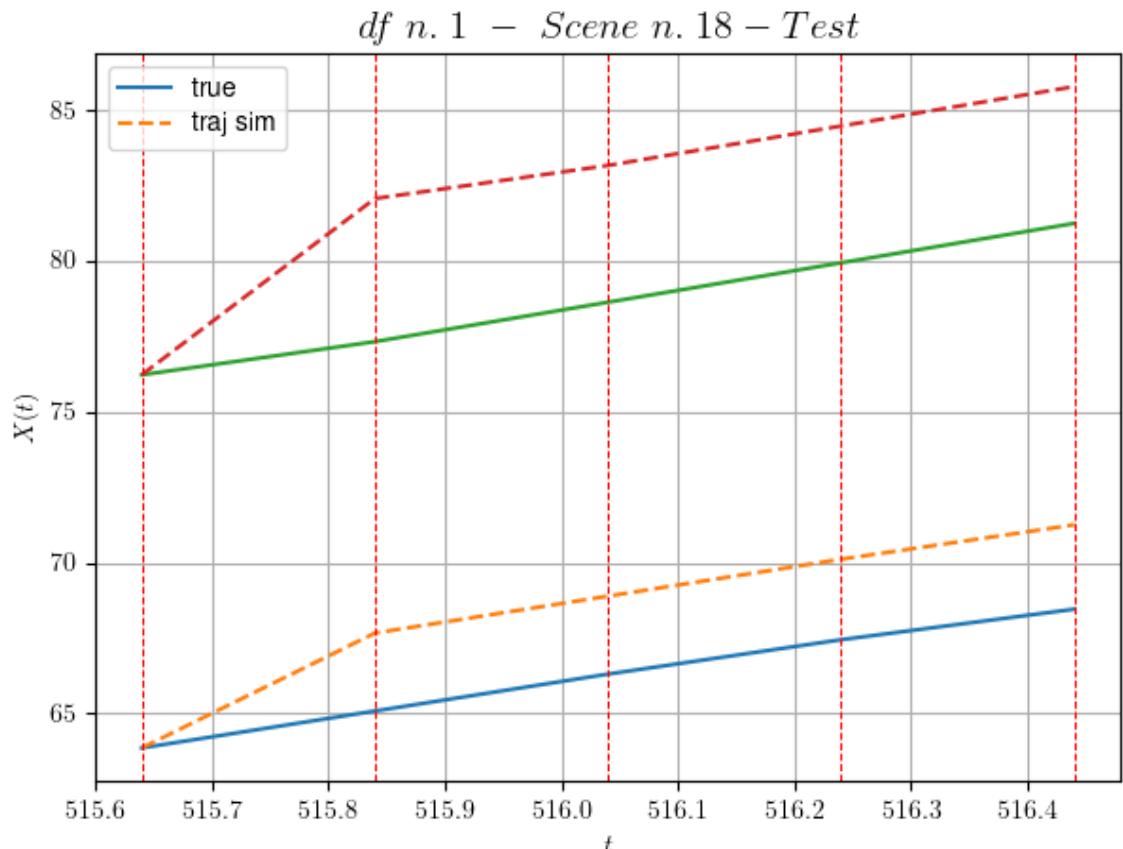
For scene 16/36:
* MSE = 1.7835961636026005

DataFrame n.1. Scene n.17/36



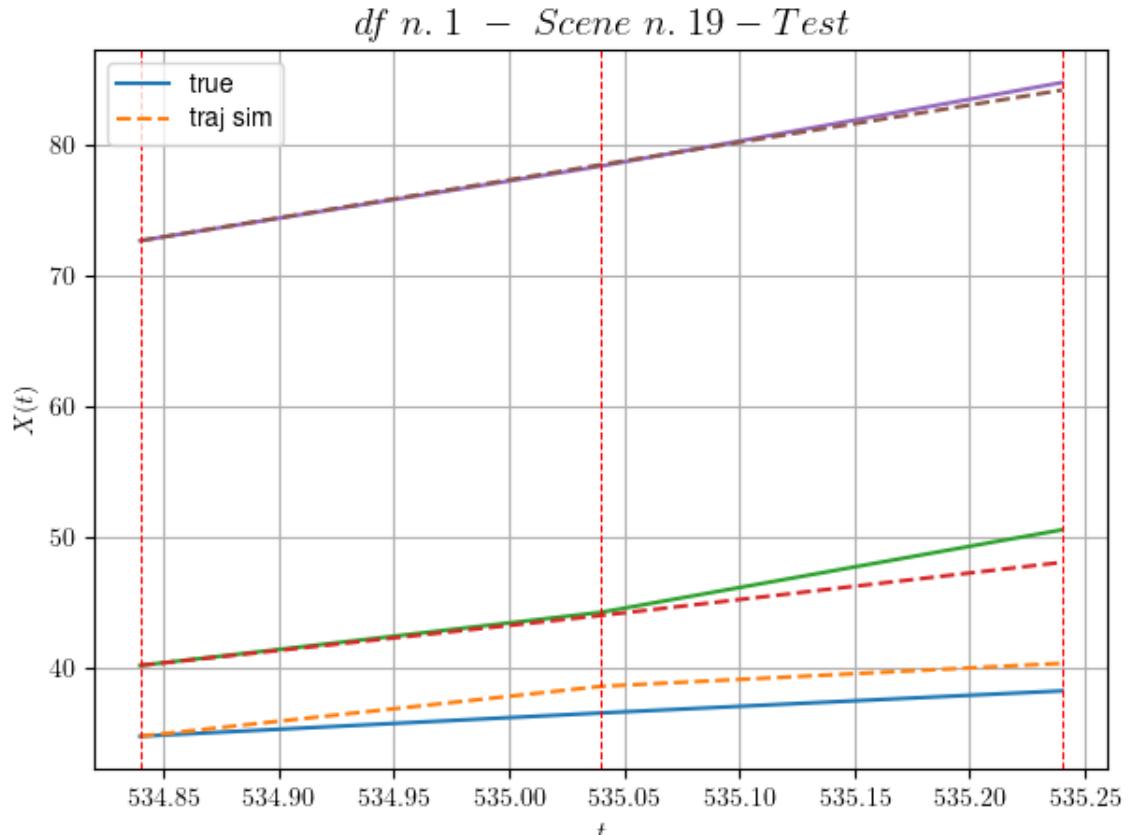
For scene 17/36:
* MSE = 2.900999403011057

DataFrame n.1. Scene n.18/36



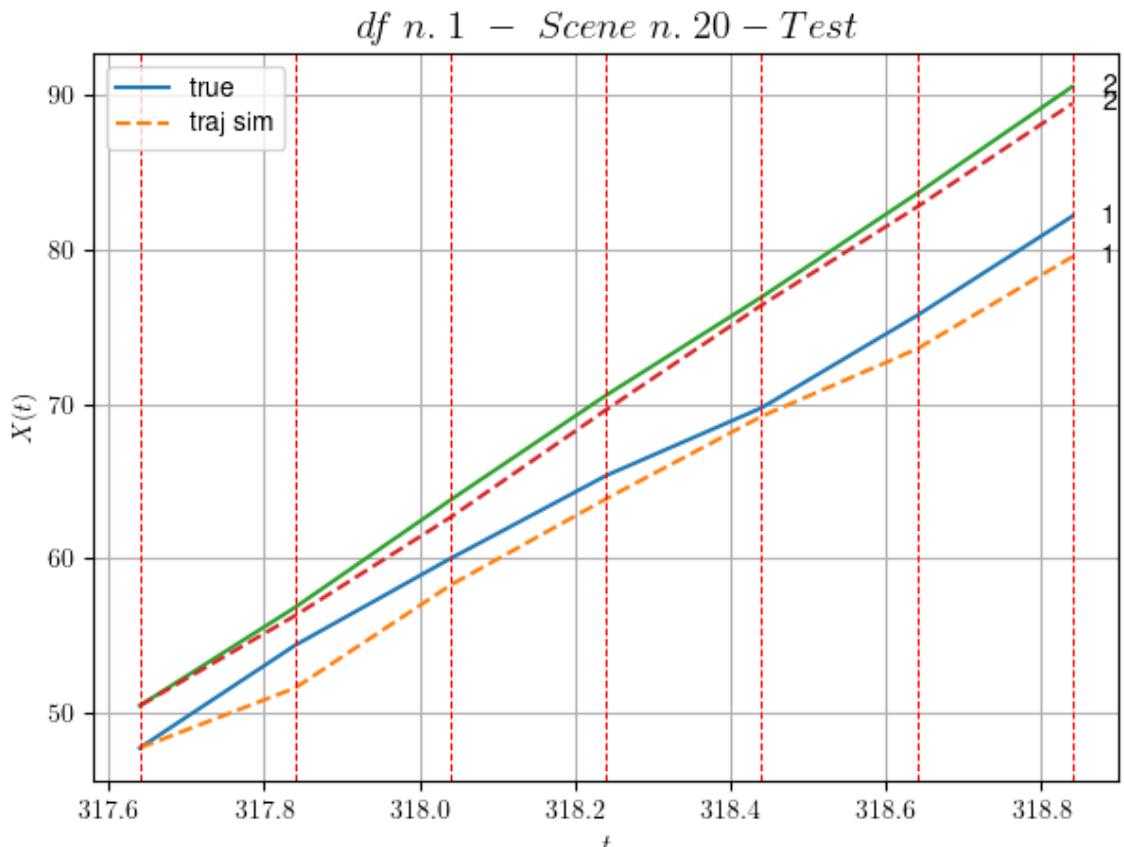
For scene 18/36:
* MSE = 11.19865868127636

DataFrame n.1. Scene n.19/36



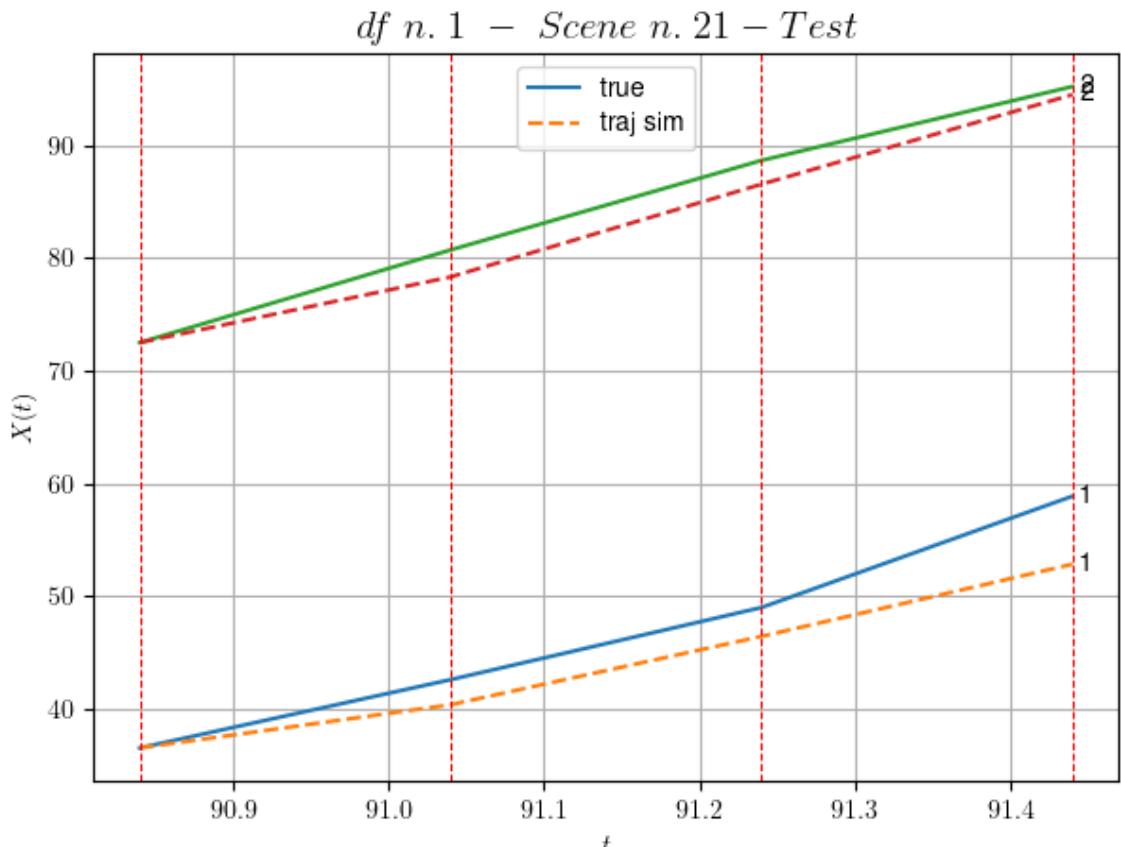
For scene 19/36:
* MSE = 1.697237214886826

DataFrame n.1. Scene n.20/36



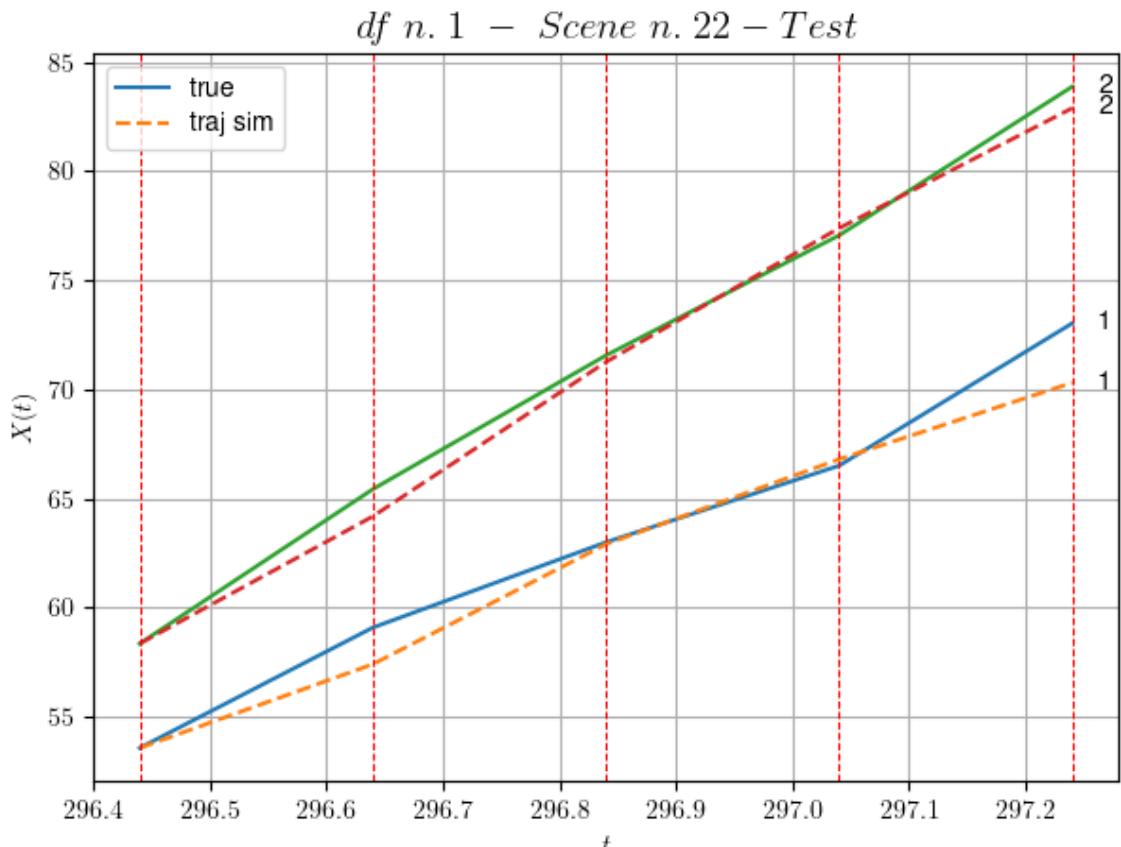
For scene 20/36:
* MSE = 2.0979741925046165

DataFrame n.1. Scene n.21/36



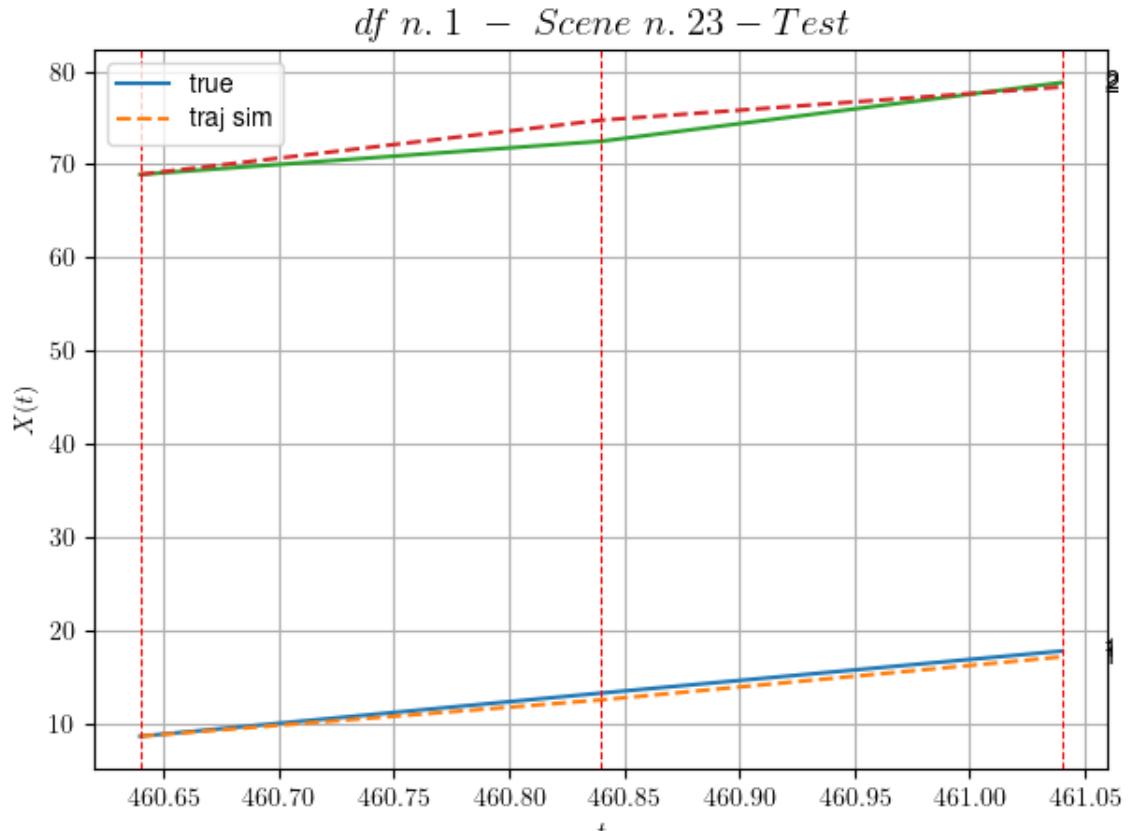
For scene 21/36:
* MSE = 7.332136147130012

DataFrame n.1. Scene n.22/36



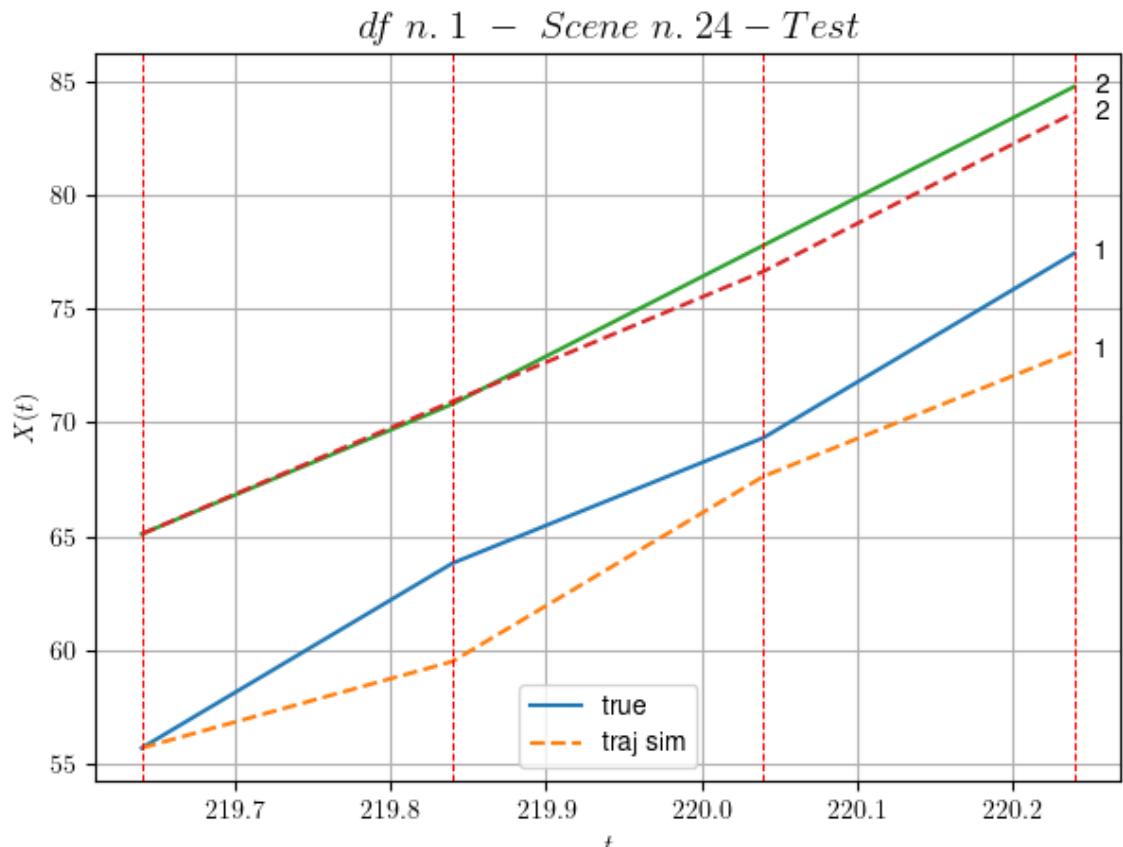
For scene 22/36:
* MSE = 1.3056533511837625

DataFrame n.1. Scene n.23/36



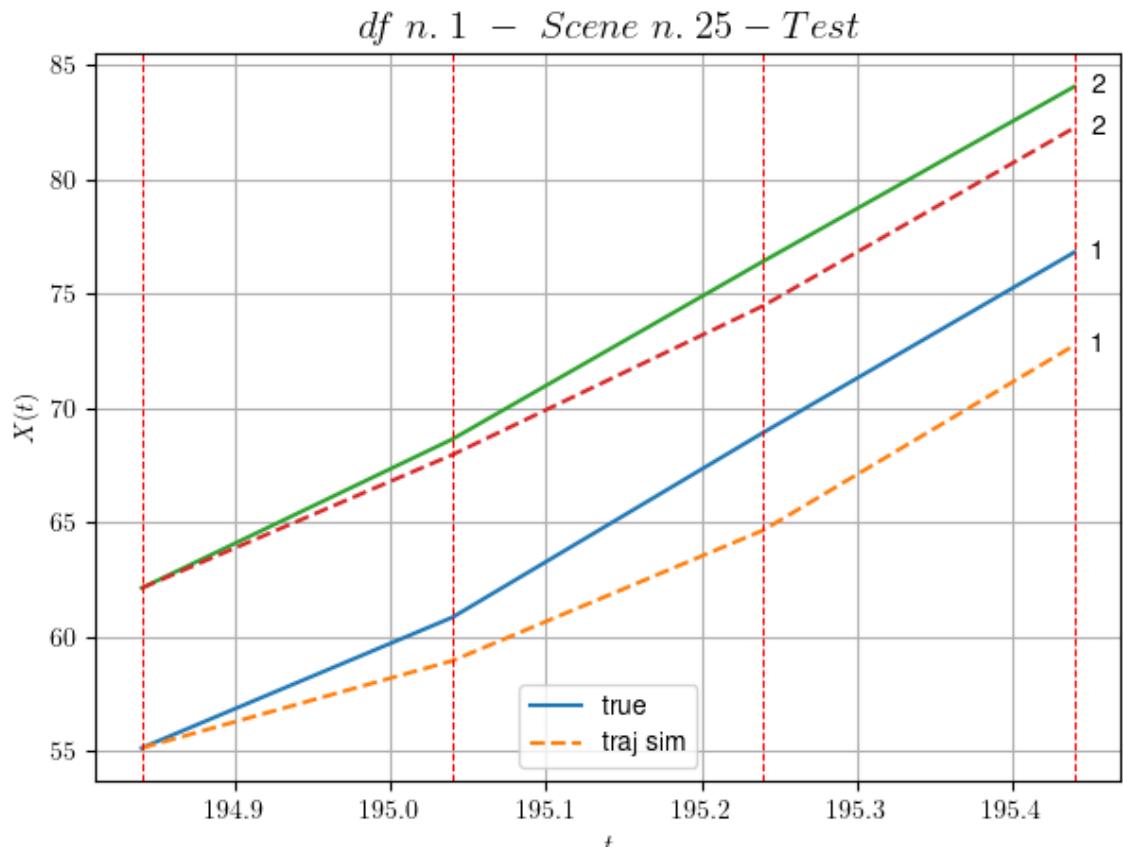
For scene 23/36:
* MSE = 1.0470610364267592

DataFrame n.1. Scene n.24/36



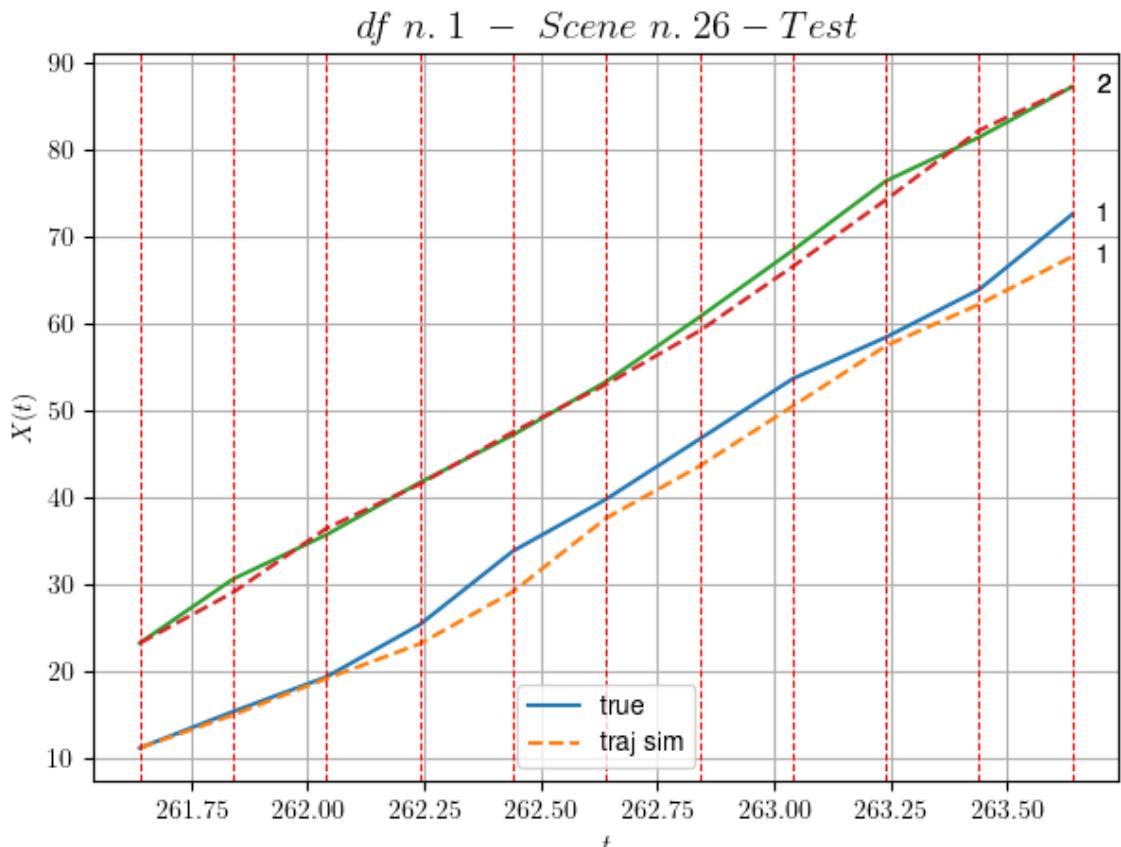
For scene 24/36:
* MSE = 5.338389848090225

DataFrame n.1. Scene n.25/36



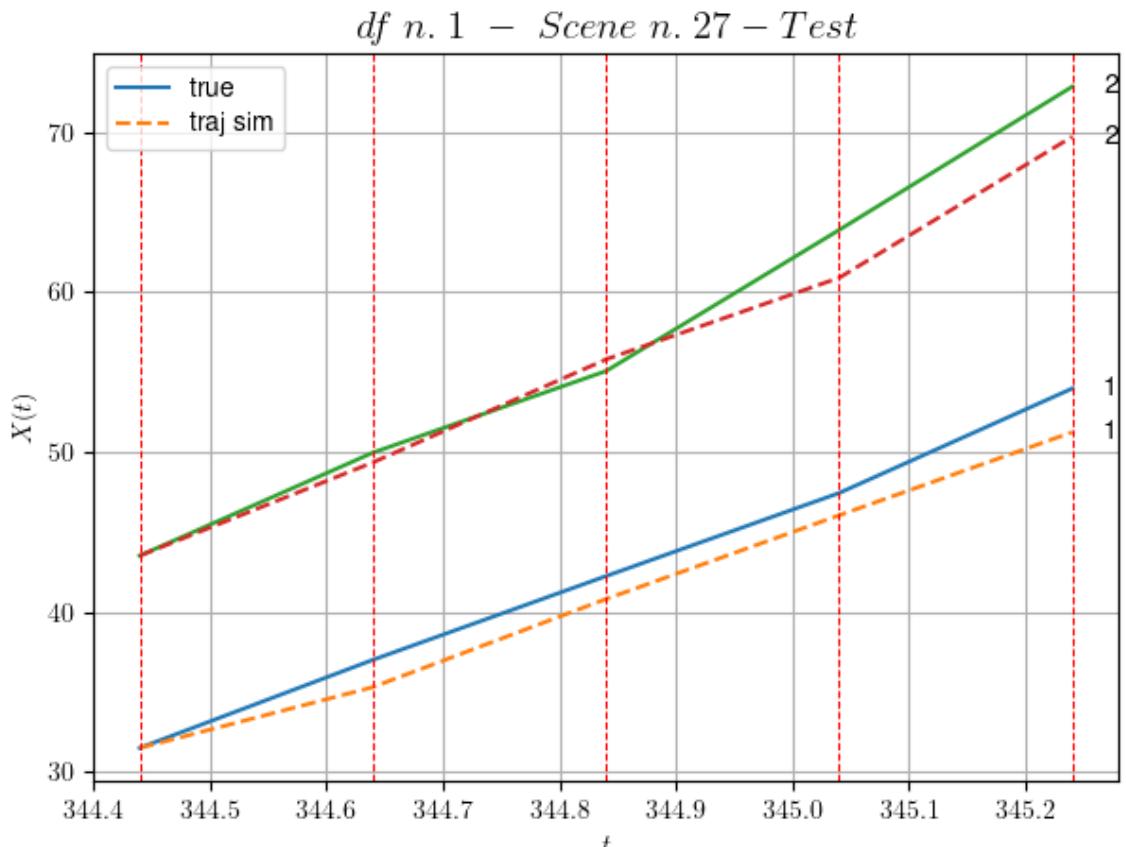
For scene 25/36:
* MSE = 5.728395205430004

DataFrame n.1. Scene n.26/36



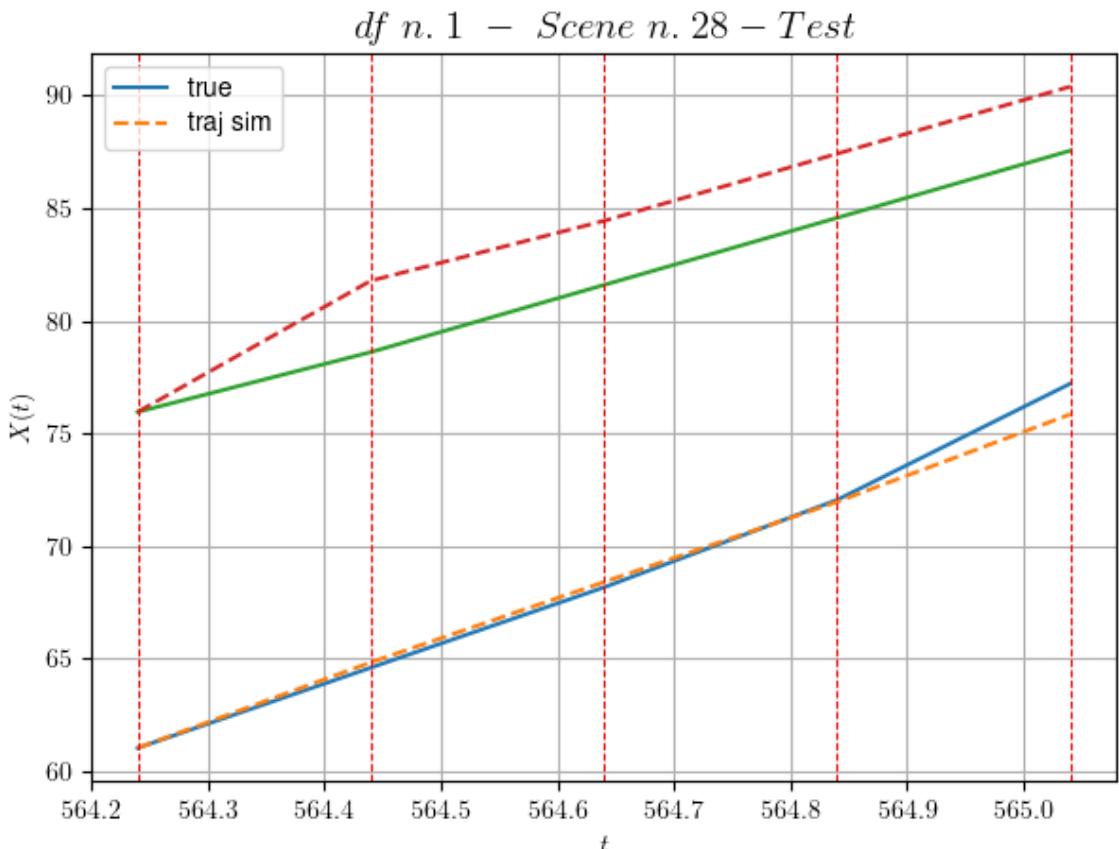
For scene 26/36:
* MSE = 4.253327432817011

DataFrame n.1. Scene n.27/36



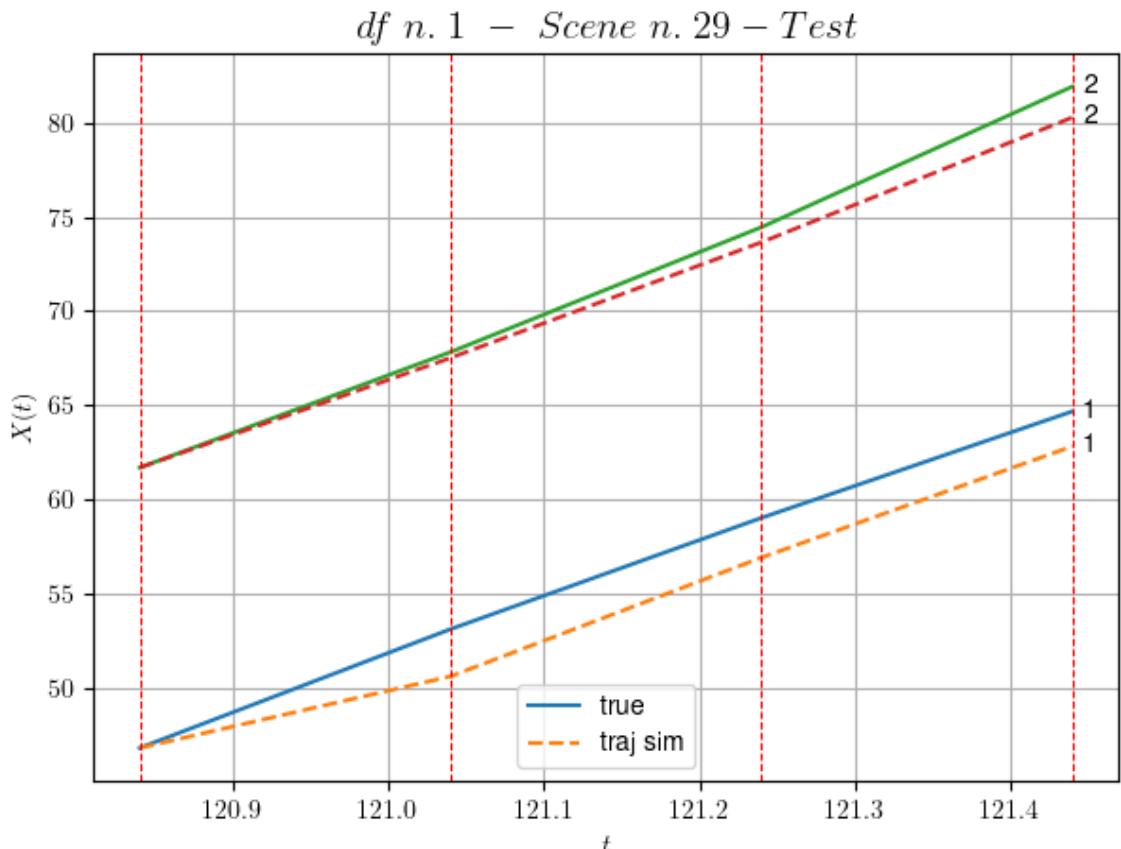
For scene 27/36:
* MSE = 3.4022933006941867

DataFrame n.1. Scene n.28/36



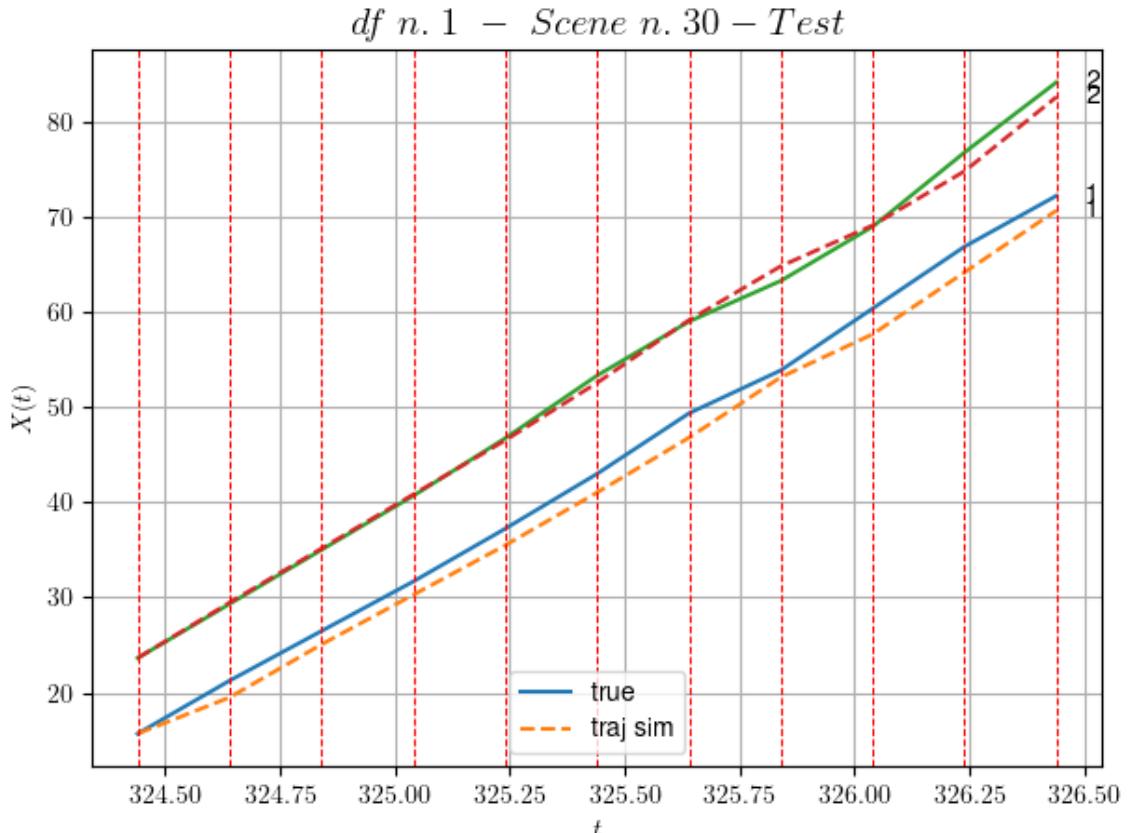
For scene 28/36:
* MSE = 3.6342394295761893

DataFrame n.1. Scene n.29/36



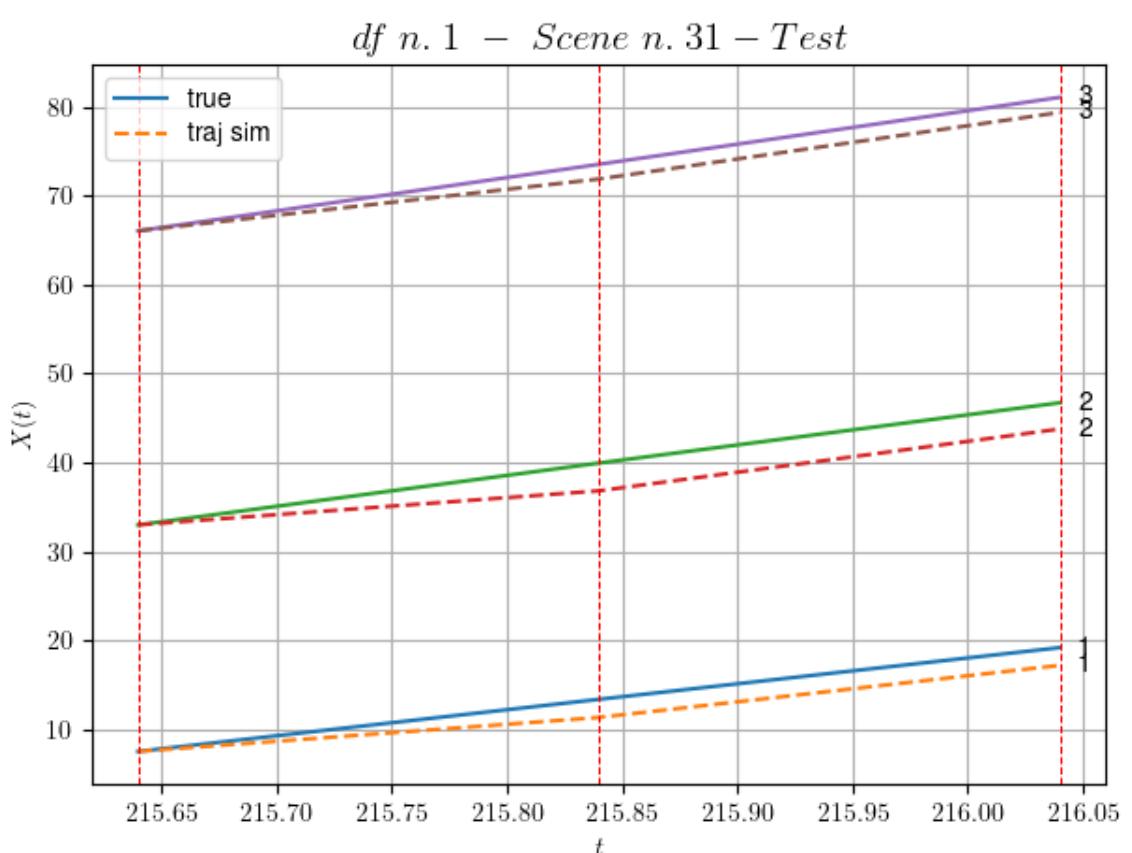
For scene 29/36:
* MSE = 2.198456181890803

DataFrame n.1. Scene n.30/36



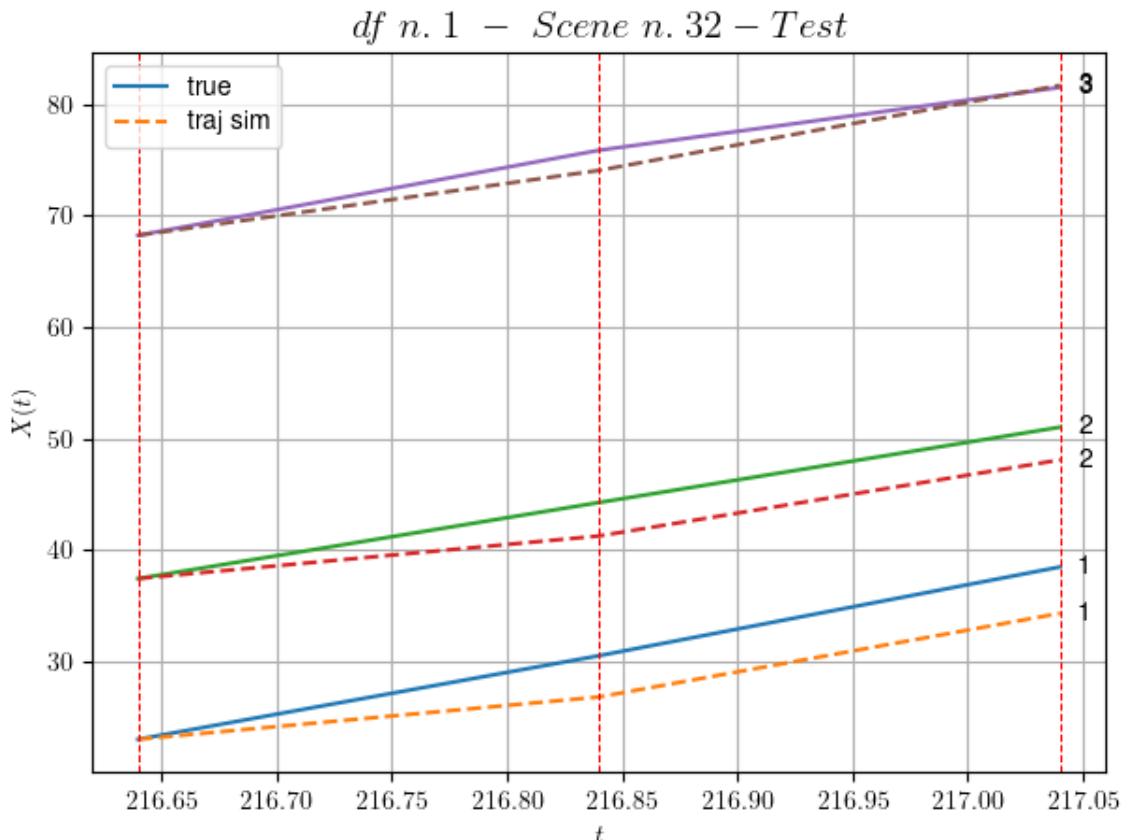
For scene 30/36:
* MSE = 2.1570448710162053

DataFrame n.1. Scene n.31/36



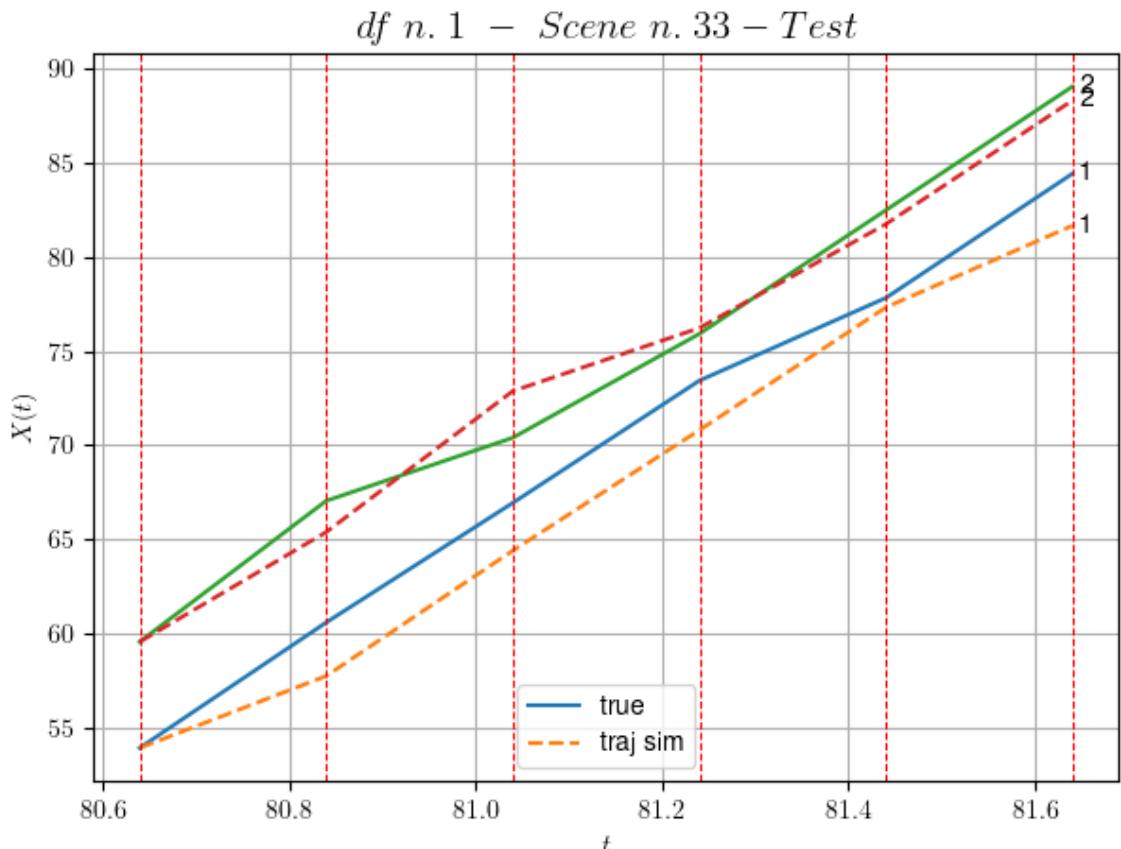
For scene 31/36:
* MSE = 3.5674234321600906

DataFrame n.1. Scene n.32/36



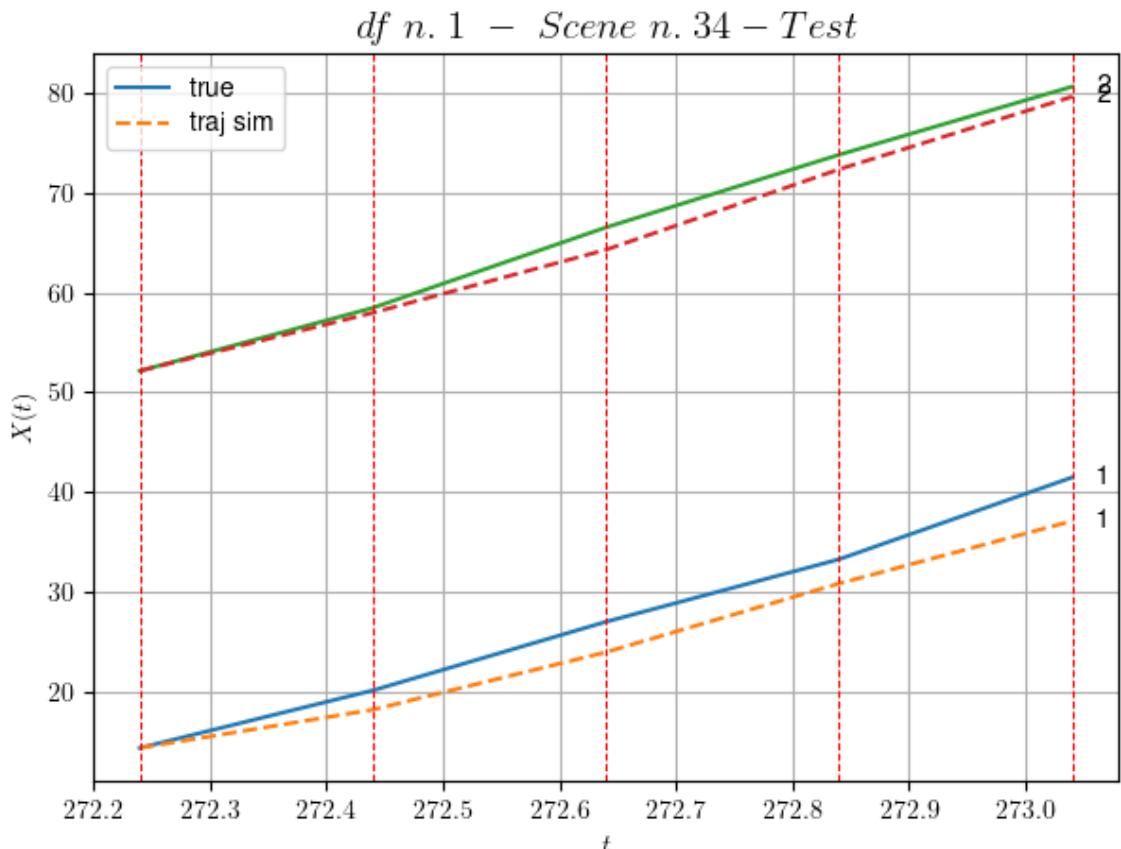
For scene 32/36:
* MSE = 5.773957793640608

DataFrame n.1. Scene n.33/36



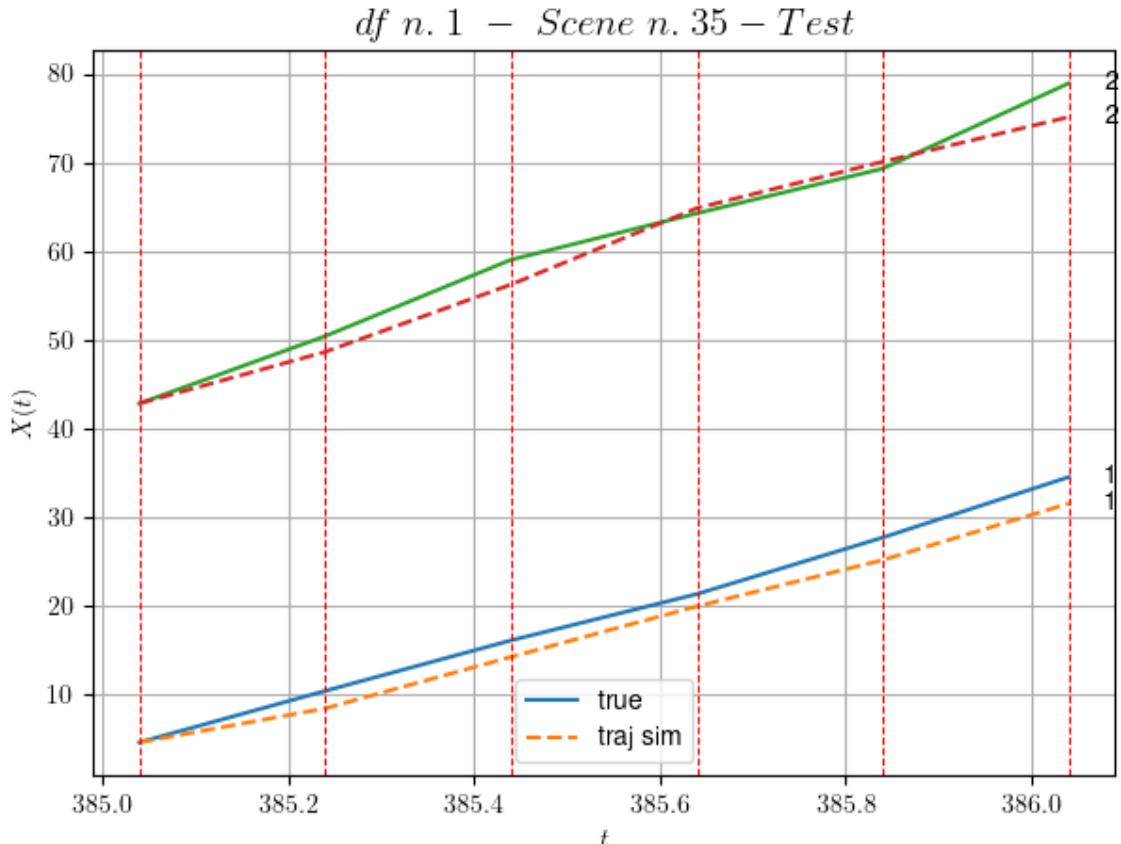
For scene 33/36:
* MSE = 3.2852596878597864

DataFrame n.1. Scene n.34/36



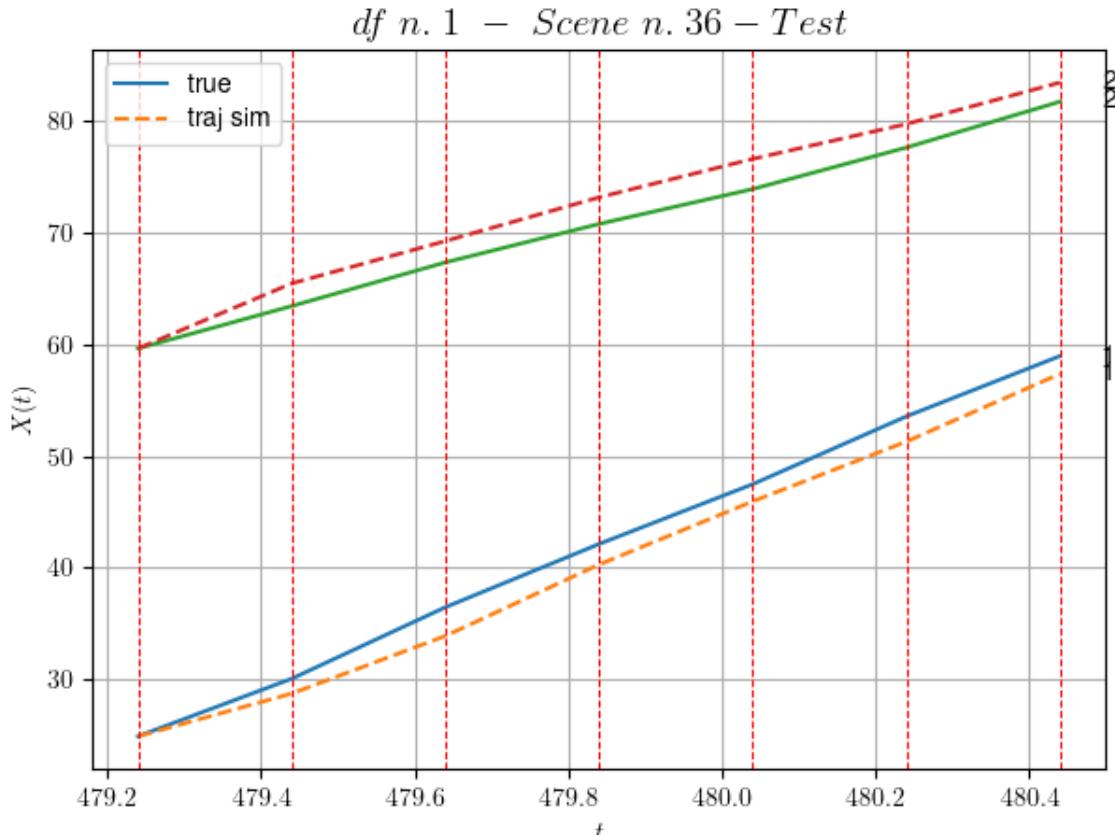
For scene 34/36:
* MSE = 4.655129865935596

DataFrame n.1. Scene n.35/36



For scene 35/36:
* MSE = 4.2617402538155

DataFrame n.1. Scene n.36/36



For scene 36/36:
 * MSE = 3.5685396057648164

MSE test: 3.260711790102286

Summing up:
 * MSE train: 0.5658022405085427
 * MSE test: 3.260711790102286

Analyzing 2/10 dfs.

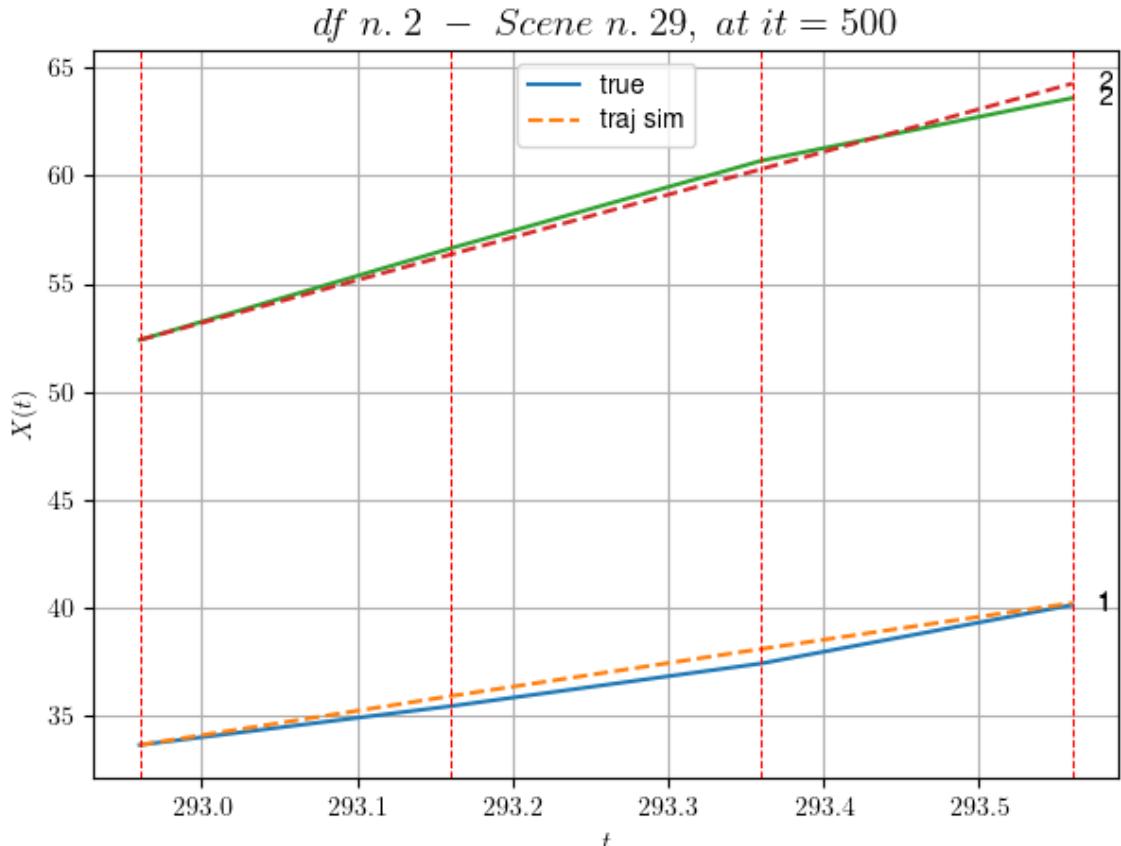
In DataFrame n.2 we have 69 scenes.

To train the model we use 46 scenes, the remaining 23 to test the model.

Training step. (46 scenes)

DataFrame n.2. Scene n.1/46

We have 3 time intervals inside [292.96, 293.56]

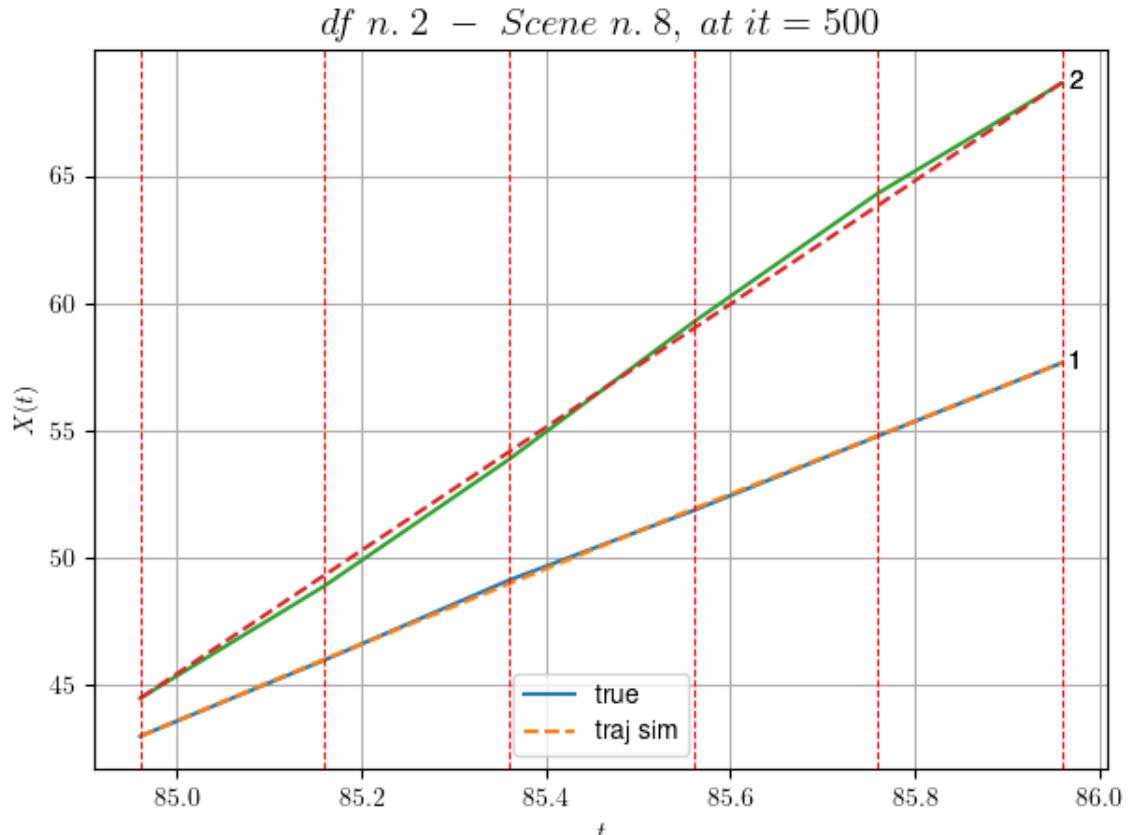


For scene 1/46:

* After LR finder: LR_NN=5e-05 with mse=7.914837620501777 at it=24
* v0 = 19.771247175293336
* MSE = 0.16952819164773963
* iterations = 500

DataFrame n.2. Scene n.2/46

We have 5 time intervals inside [84.96,85.96]

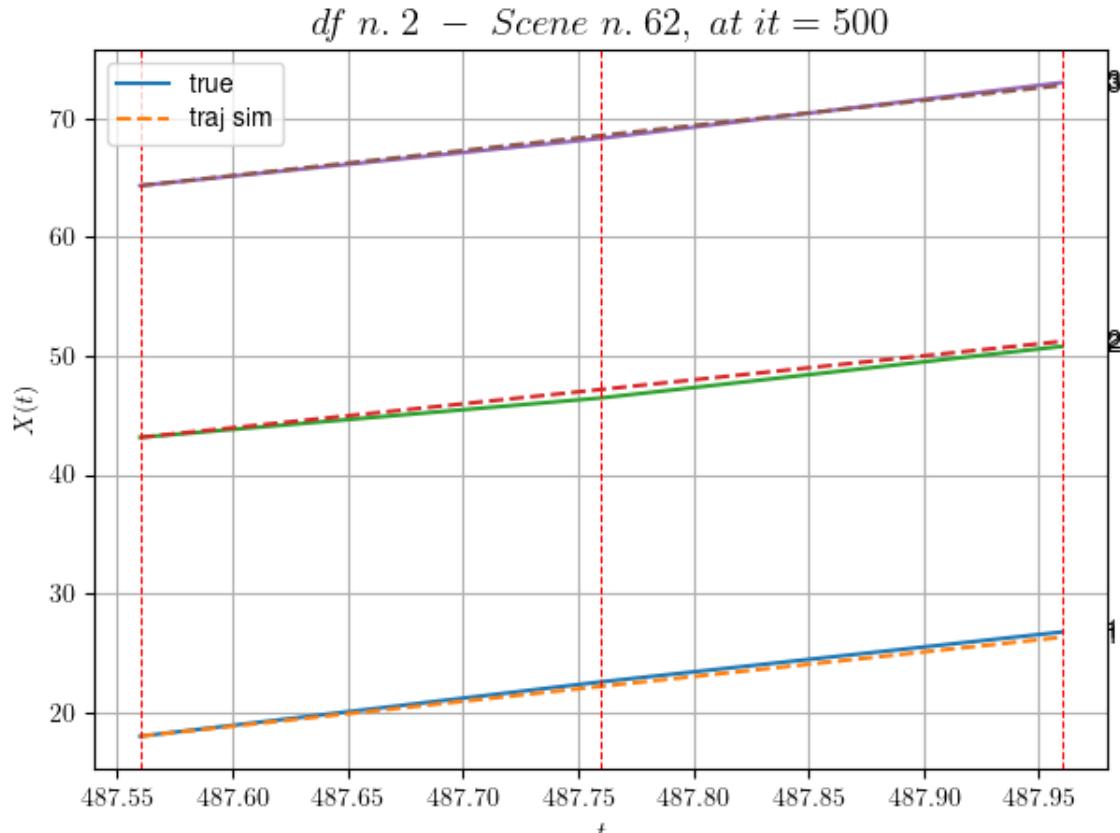


For scene 2/46:

- * After LR finder: LR_NN=0.001 with mse=10.204666799261688 at it=24
- * v0 = 24.168678500842805
- * MSE = 0.045756904949833546
- * iterations = 500

DataFrame n.2. Scene n.3/46

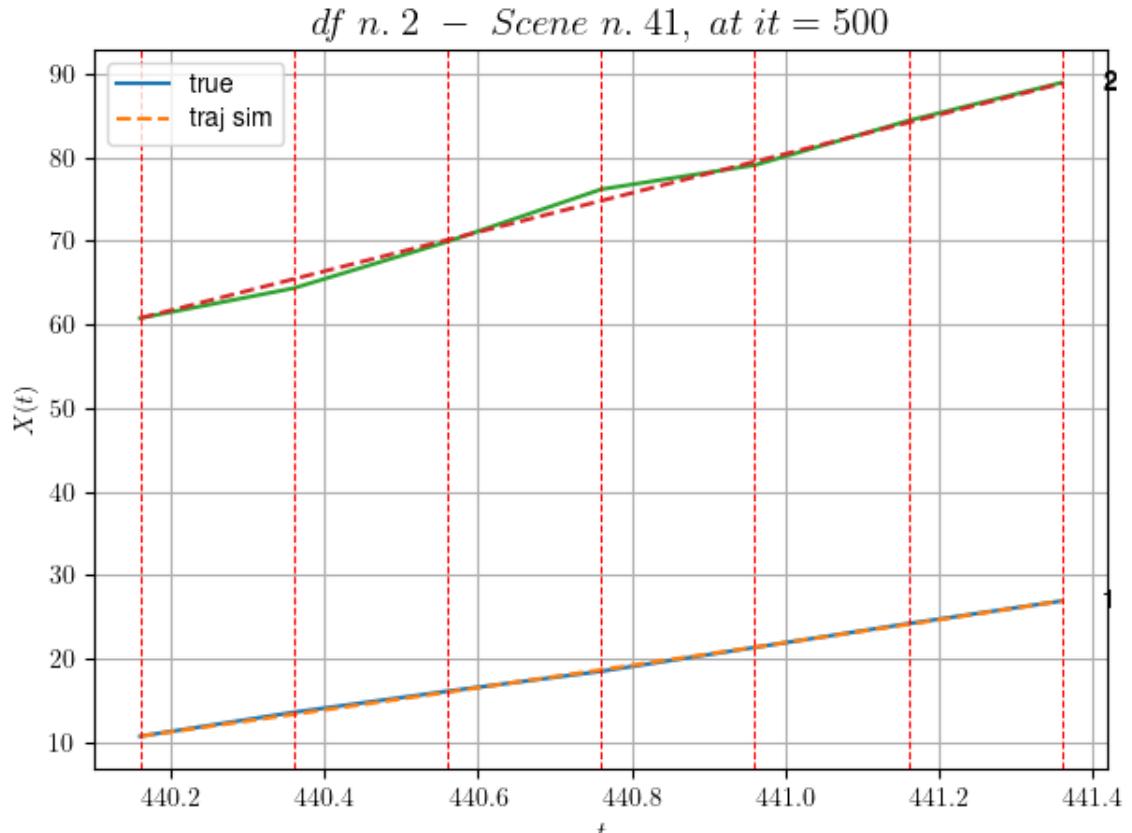
We have 2 time intervals inside [487.56, 487.96]



For scene 3/46:
* After LR finder: LR_NN=5e-05 with mse=1.6965734278197437
at it=24
* v0 = 21.111900247991947
* MSE = 0.12274285616610468
* iterations = 500

DataFrame n.2. Scene n.4/46

We have 6 time intervals inside [440.16,441.36]

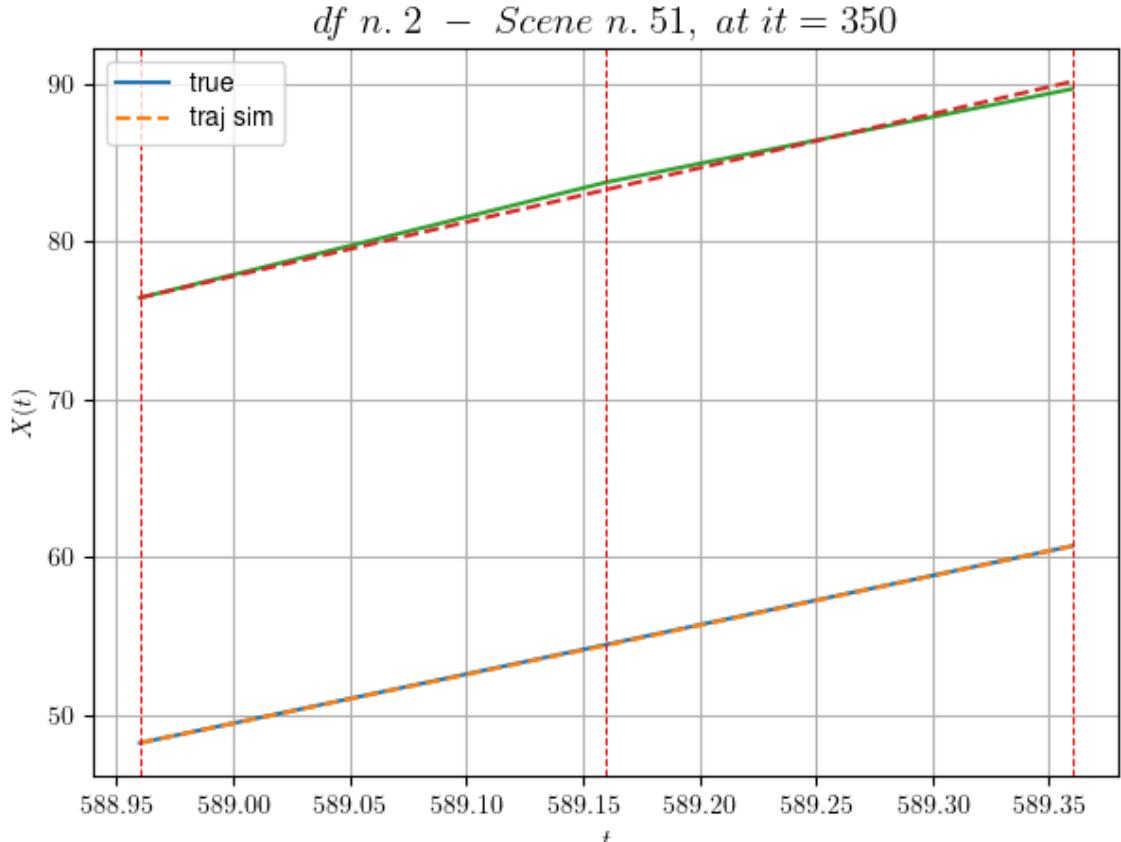


For scene 4/46:

- * After LR finder: $LR_NN=5e-05$ with $mse=11.147432149592403$
- at $it=24$
- * $v_0 = 23.380815312672144$
- * $MSE = 0.24440146781318758$
- * iterations = 500

DataFrame n.2. Scene n.5/46

We have 2 time intervals inside [588.96, 589.36]

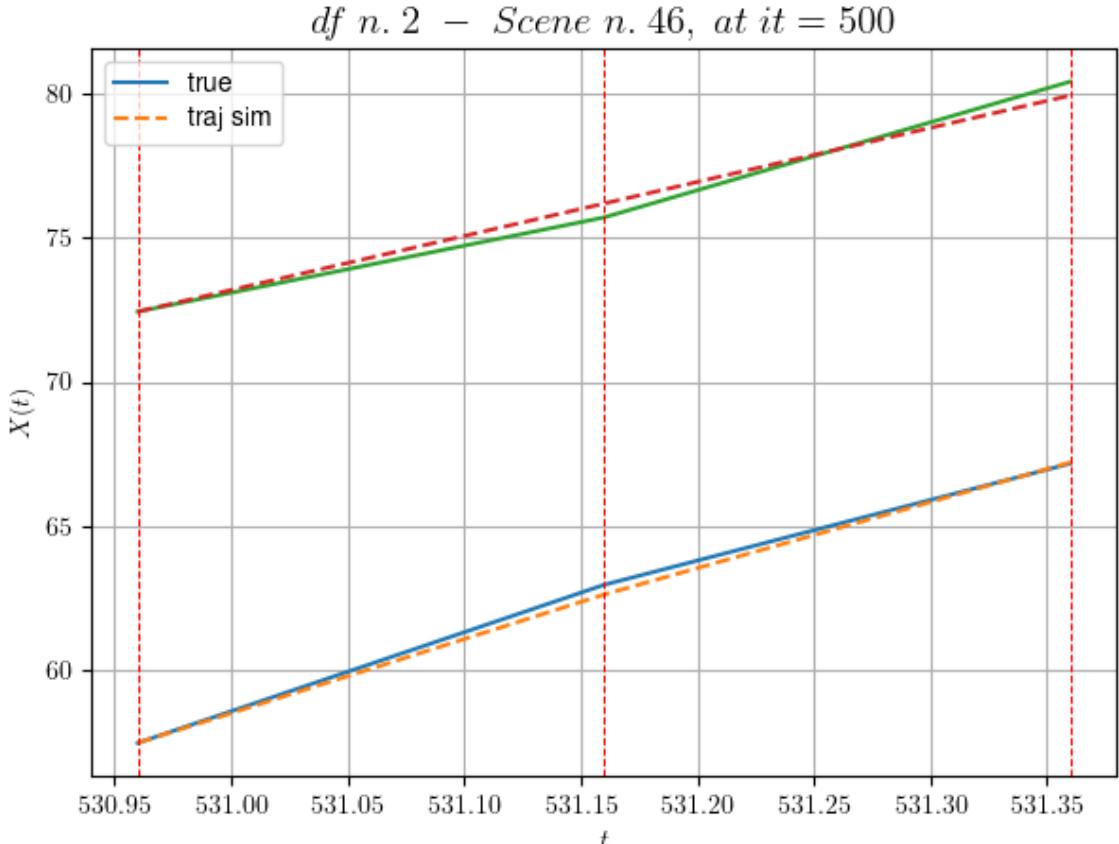


For scene 5/46:

* After LR finder: LR_NN=5e-05 with mse=0.5377388819242674
at it=24
* v0 = 34.22110961910986
* MSE = 0.06572313589390238
* iterations = 350

DataFrame n.2. Scene n.6/46

We have 2 time intervals inside [530.96,531.36]

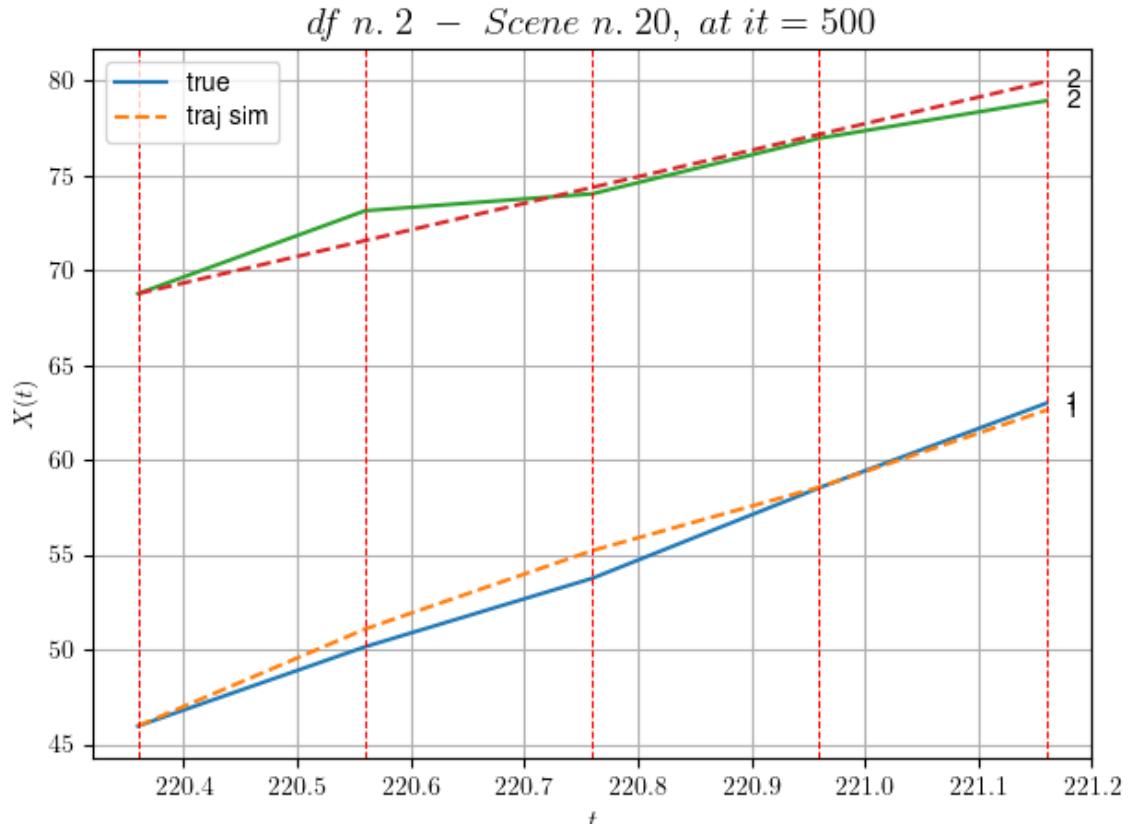


For scene 6/46:

* After LR finder: LR_NN=0.0005 with mse=3.932784213986077
at it=24
* v0 = 18.78540832306855
* MSE = 0.09696103815333892
* iterations = 500

DataFrame n.2. Scene n.7/46

We have 4 time intervals inside [220.36,221.16]

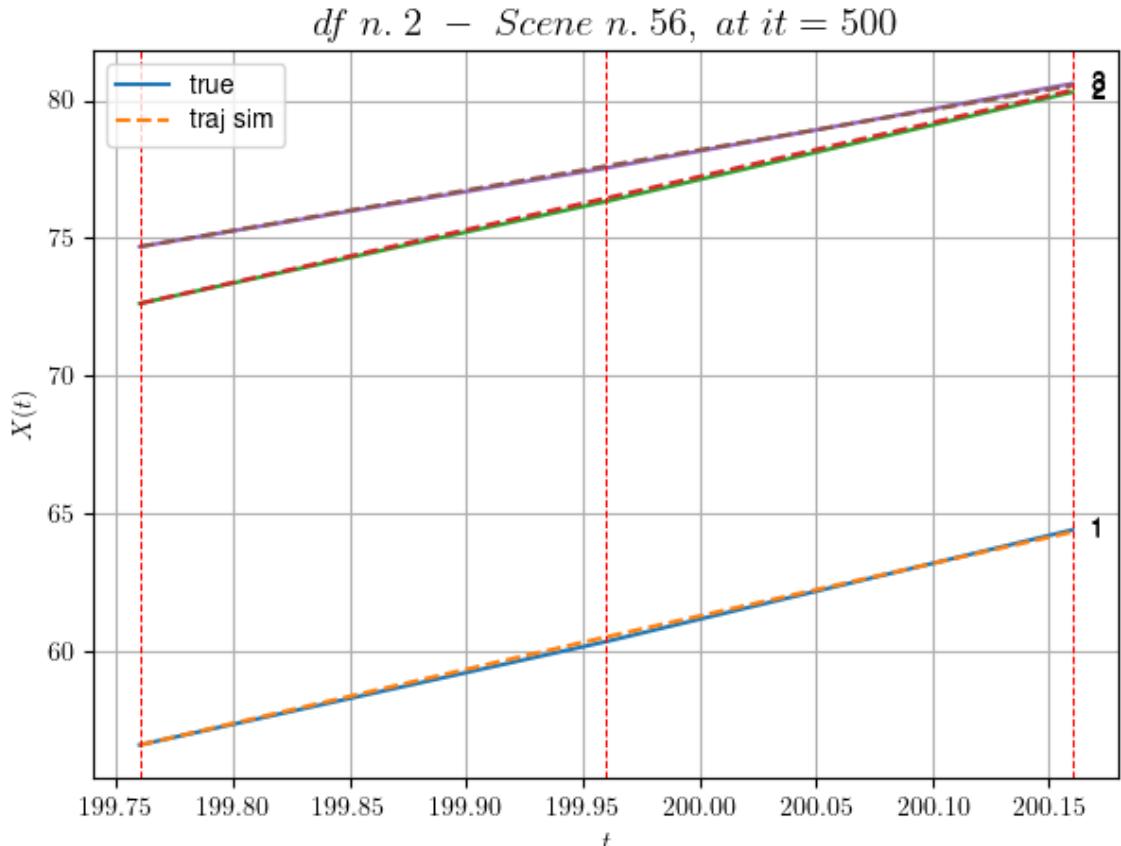


For scene 7/46:

* After LR finder: LR_NN=0.001 with mse=33.73770915402419 at it=24
* v0 = 13.996427133410247
* MSE = 0.5486427766528578
* iterations = 500

DataFrame n.2. Scene n.8/46

We have 2 time intervals inside [199.76,200.16]

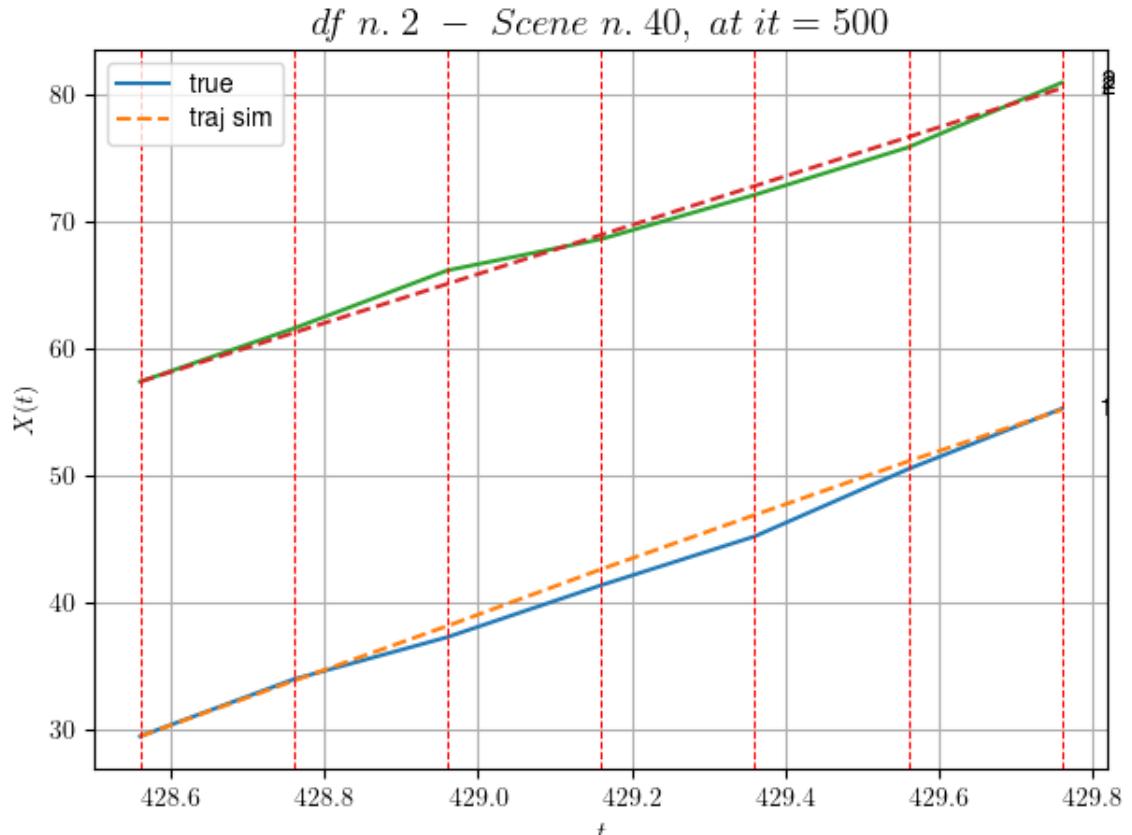


For scene 8/46:

* After LR finder: LR_NN=0.001 with mse=10.382091832960816
at it=24
* v0 = 14.651669964039801
* MSE = 0.007032666365267125
* iterations = 500

DataFrame n.2. Scene n.9/46

We have 6 time intervals inside [428.56,429.76]

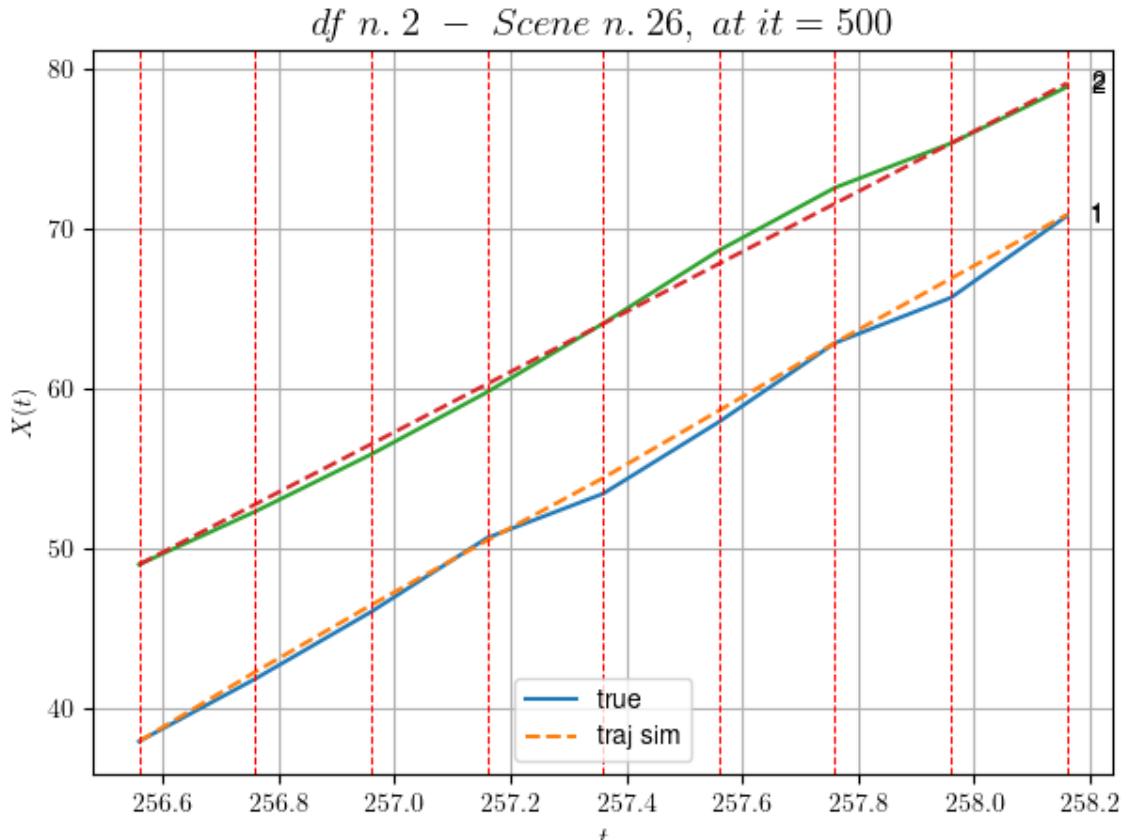


For scene 9/46:

- * After LR finder: LR_NN=1e-05 with mse=31.21522655850572 at it=24
- * v0 = 19.277810356523357
- * MSE = 0.5911796079408702
- * iterations = 500

DataFrame n.2. Scene n.10/46

We have 8 time intervals inside [256.56, 258.16]

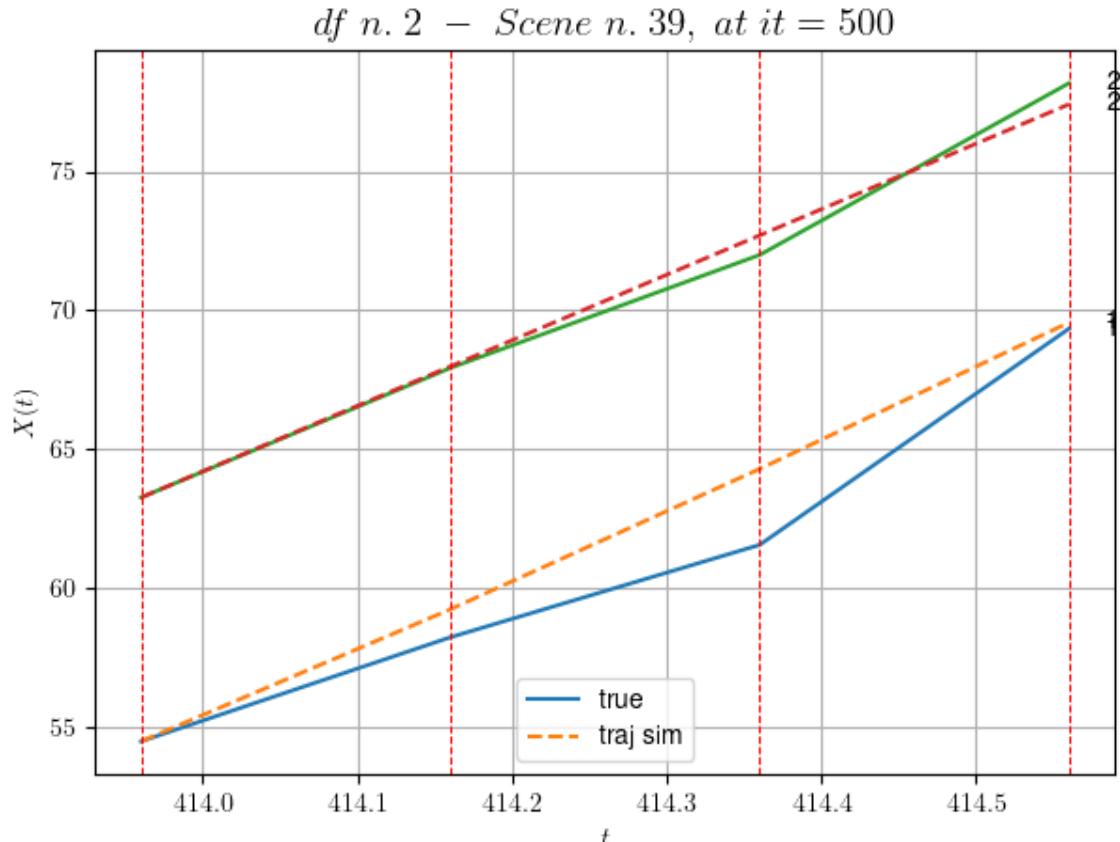


For scene 10/46:

* After LR finder: $LR_NN=5e-05$ with $mse=55.640968562676896$
at it=24
* $v_0 = 18.83297804546212$
* $MSE = 0.307166646816512$
* iterations = 500

DataFrame n.2. Scene n.11/46

We have 3 time intervals inside [413.96, 414.56]

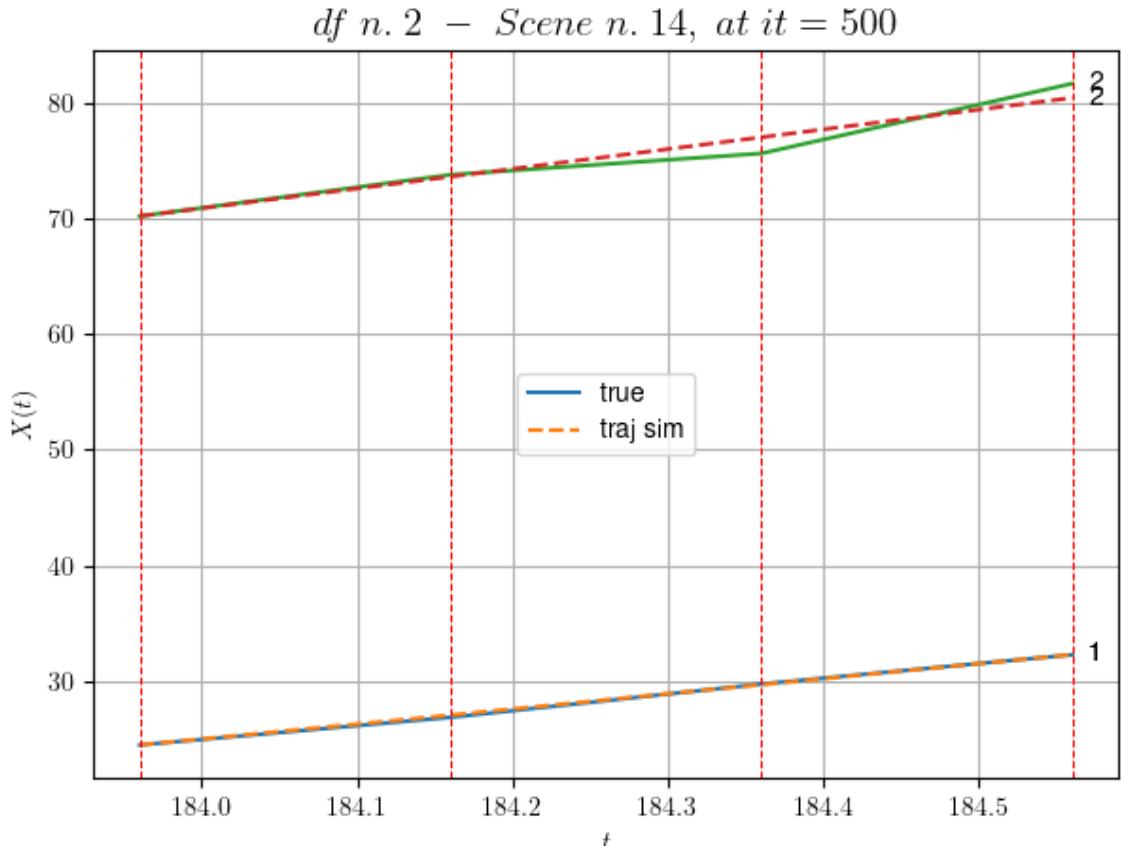


For scene 11/46:

* After LR finder: $LR_NN=5e-05$ with $mse=3.7967680558959493$
at it=24
* $v_0 = 23.615524542915857$
* MSE = 1.203295405692937
* iterations = 500

DataFrame n.2. Scene n.12/46

We have 3 time intervals inside [183.96, 184.56]

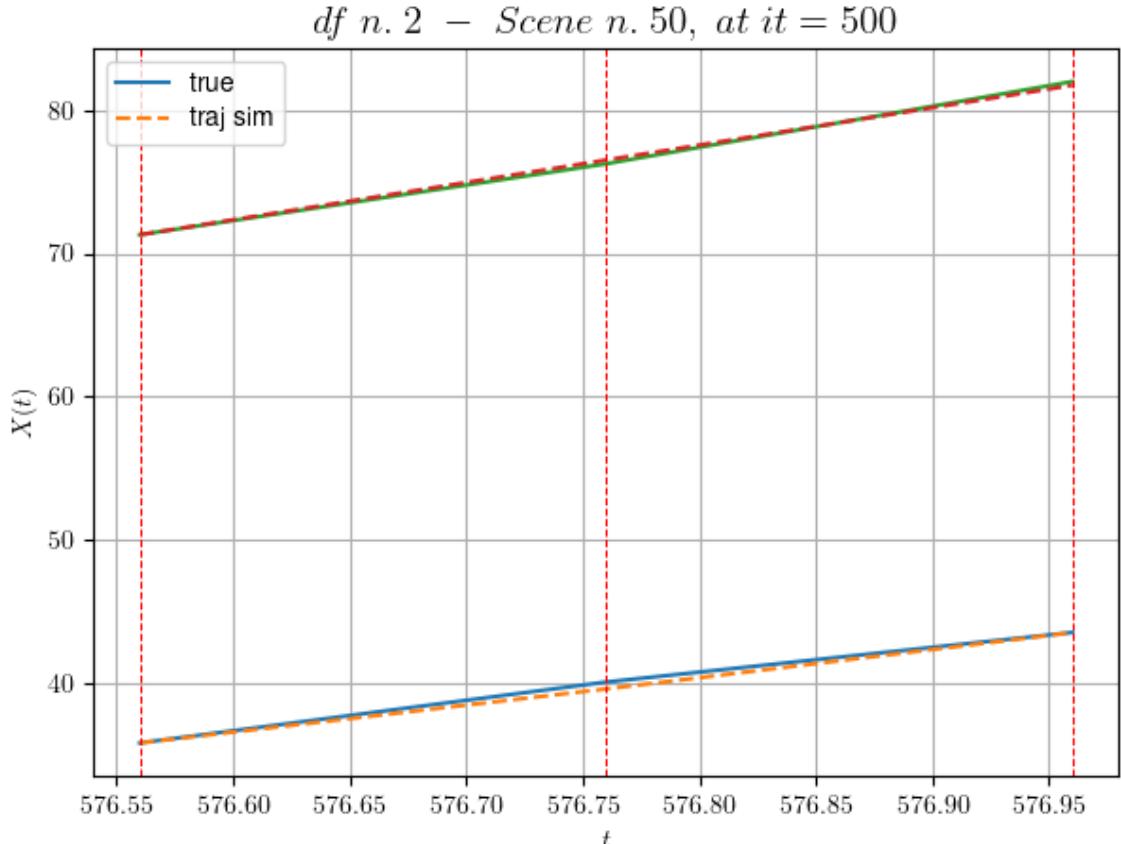


For scene 12/46:

* After LR finder: LR_NN=1e-05 with mse=11.49241911441696 at it=24
* v0 = 17.05181090872074
* MSE = 0.4332708617697917
* iterations = 500

DataFrame n.2. Scene n.13/46

We have 2 time intervals inside [576.56,576.96]

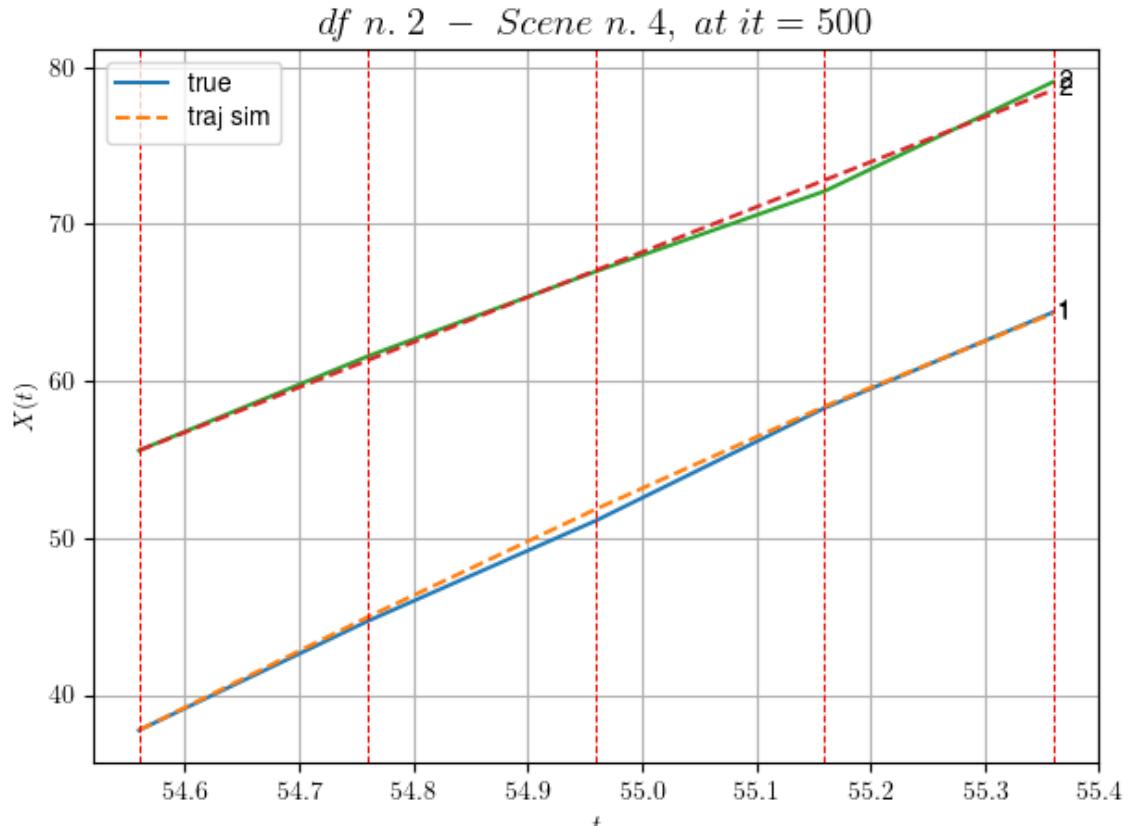


For scene 13/46:

* After LR finder: LR_NN=0.0001 with mse=0.5130098917232021
at it=24
* v0 = 26.069569095122777
* MSE = 0.0610004346857511
* iterations = 500

DataFrame n.2. Scene n.14/46

We have 4 time intervals inside [54.56,55.36]

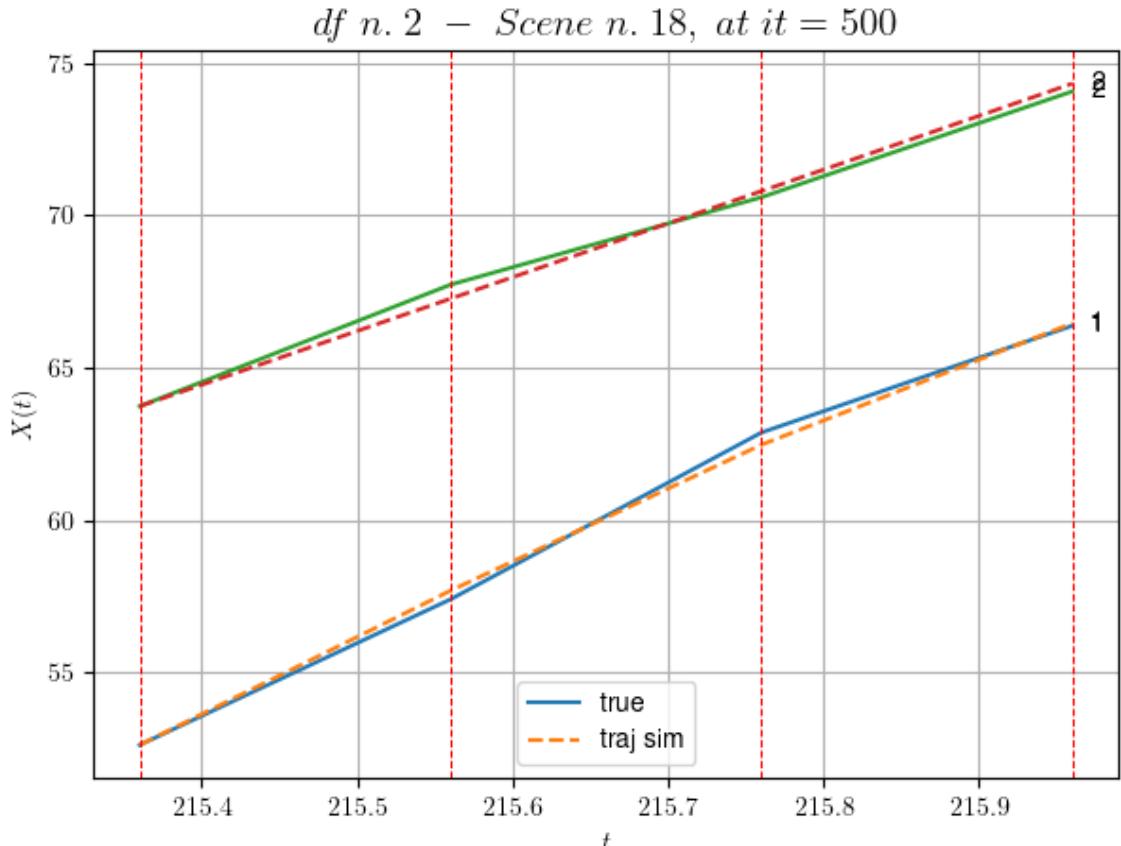


For scene 14/46:

- * After LR finder: LR_NN=5e-05 with mse=0.40912888810727815
- at it=24
 - * v0 = 28.71632130964987
 - * MSE = 0.14544837311579828
 - * iterations = 500

DataFrame n.2. Scene n.15/46

We have 3 time intervals inside [215.36,215.96]

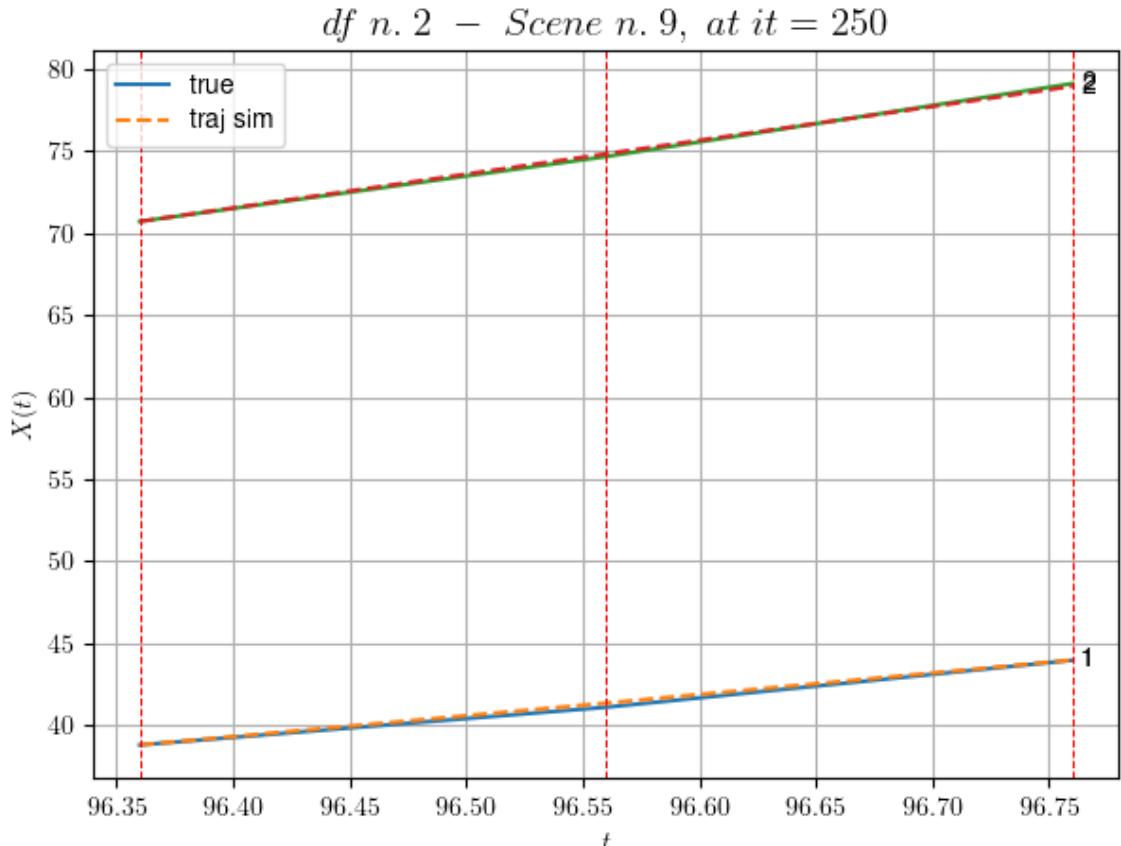


For scene 15/46:

* After LR finder: LR_NN=0.0001 with mse=11.201381140849856
at it=24
* v0 = 17.643232536852086
* MSE = 0.07072910098343345
* iterations = 500

DataFrame n.2. Scene n.16/46

We have 2 time intervals inside [96.36,96.76]

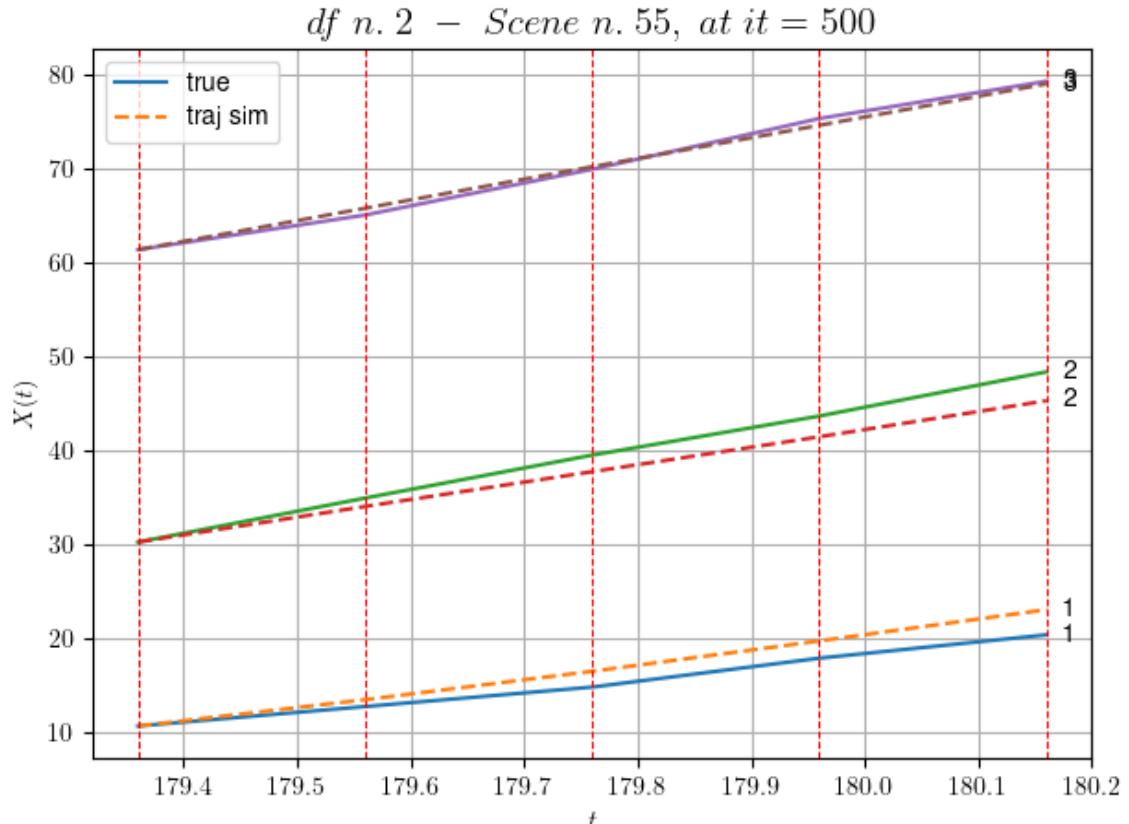


For scene 16/46:

* After LR finder: LR_NN=5e-05 with mse=2.860875857897734 at it=24
* v0 = 20.598874906185102
* MSE = 0.018969863152365127
* iterations = 250

DataFrame n.2. Scene n.17/46

We have 4 time intervals inside [179.36,180.16]

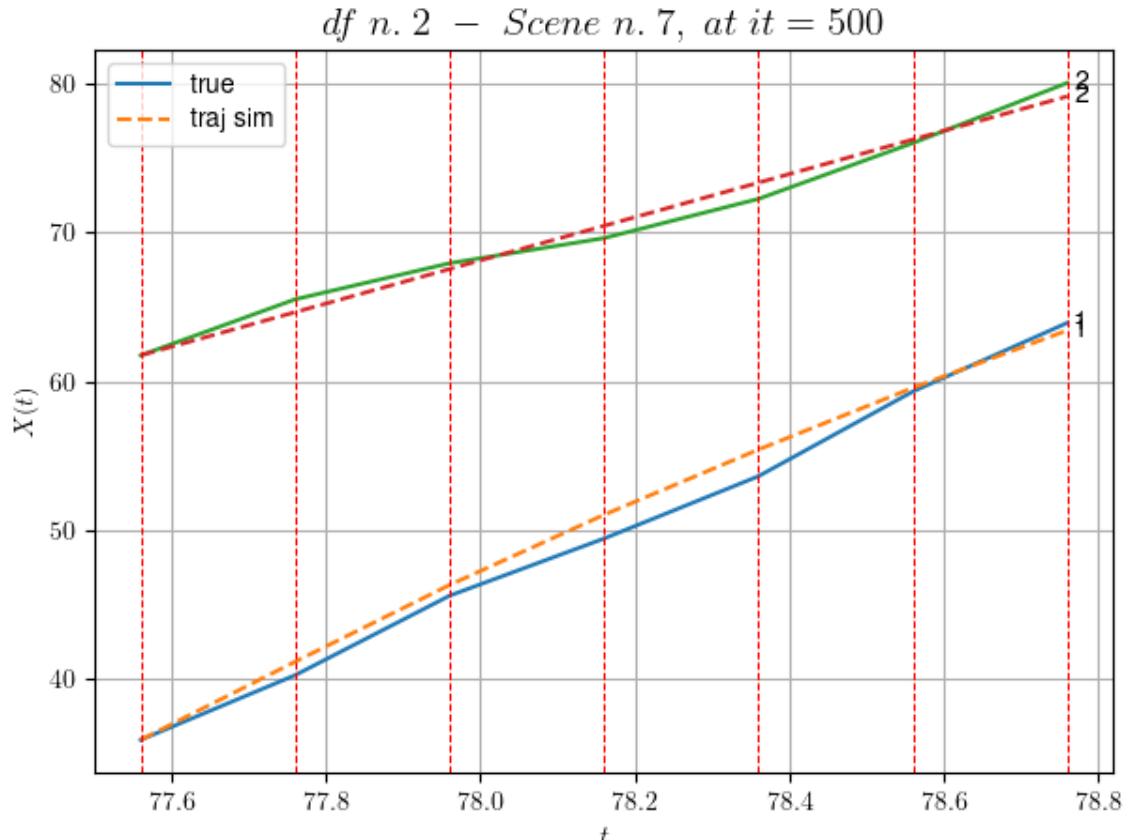


For scene 17/46:

* After LR finder: LR_NN=0.0001 with mse=5.9625191772603685
at it=24
* v0 = 22.08199952987894
* MSE = 2.017984363641158
* iterations = 500

DataFrame n.2. Scene n.18/46

We have 6 time intervals inside [77.56, 78.76]

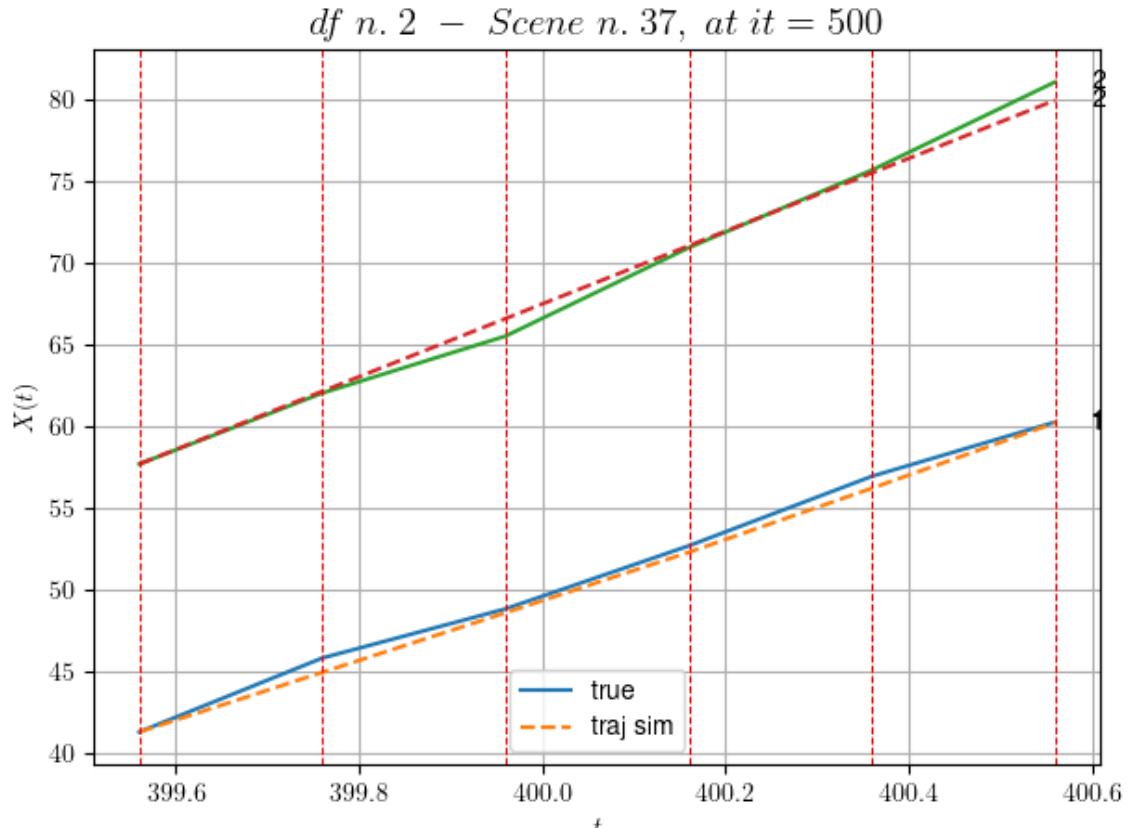


For scene 18/46:

- * After LR finder: $LR_NN=1e-05$ with $mse=63.647804252574225$
- at $it=24$
- * $v_0 = 14.529876108312994$
- * $MSE = 0.792338497290637$
- * iterations = 500

DataFrame n.2. Scene n.19/46

We have 5 time intervals inside [399.56, 400.56]

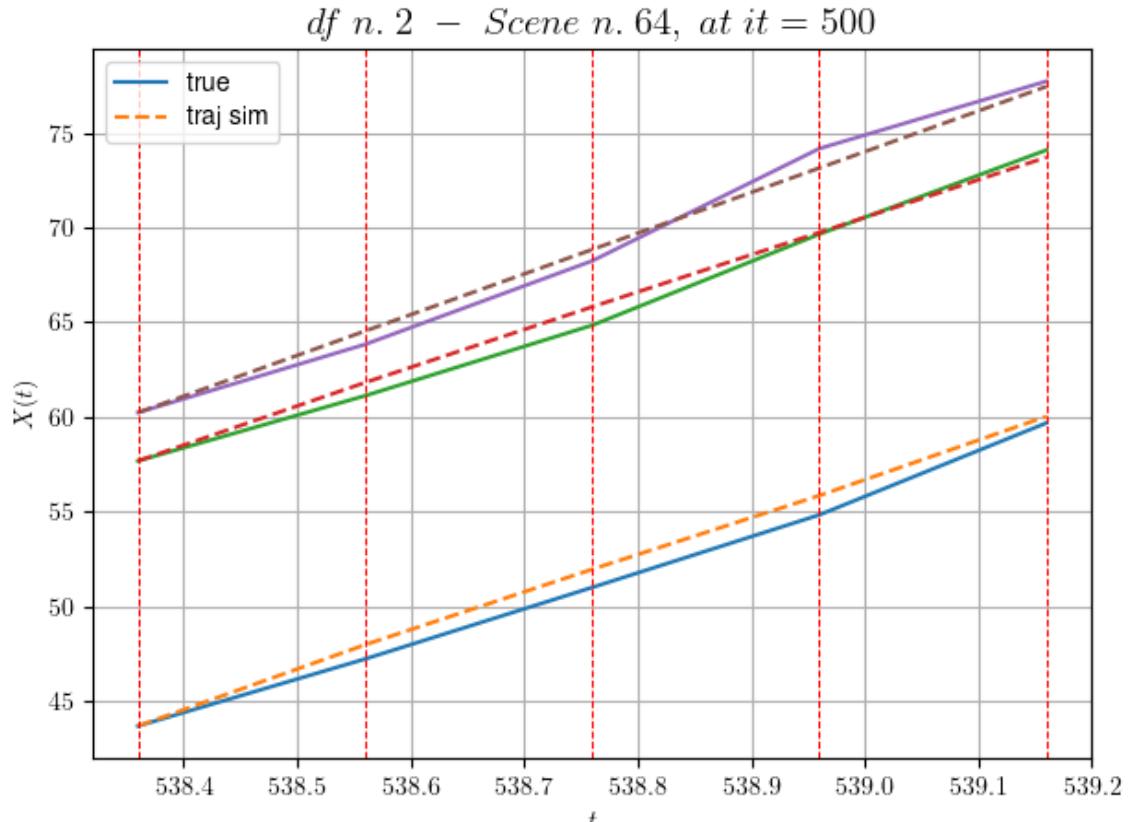


For scene 19/46:

* After LR finder: LR_NN=5e-05 with mse=10.351428282879342
at it=24
* v0 = 22.28590148402823
* MSE = 0.31748998158876796
* iterations = 500

DataFrame n.2. Scene n.20/46

We have 4 time intervals inside [538.36,539.16]

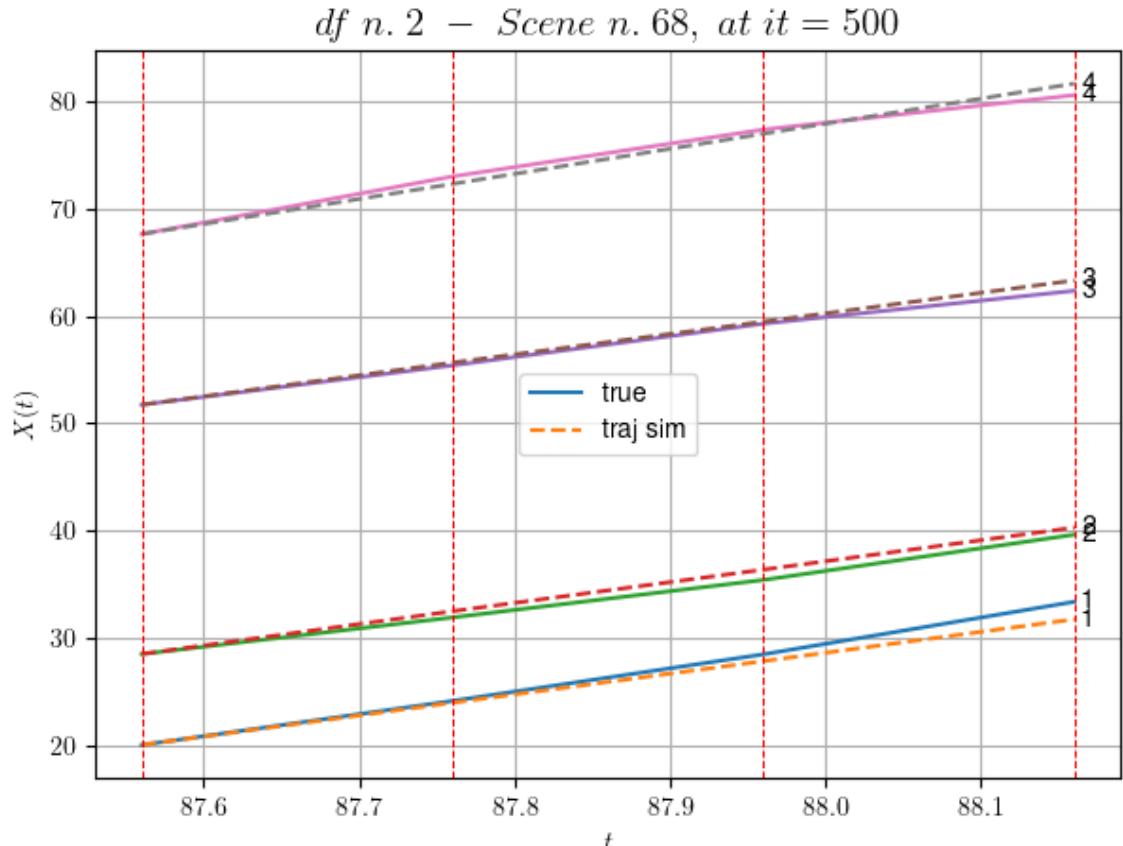


For scene 20/46:

* After LR finder: $LR_NN=0.001$ with $mse=16.587246863142287$
at $it=24$
* $v_0 = 21.518869344523967$
* $MSE = 0.40965740303153436$
* iterations = 500

DataFrame n.2. Scene n.21/46

We have 3 time intervals inside [87.56,88.16]

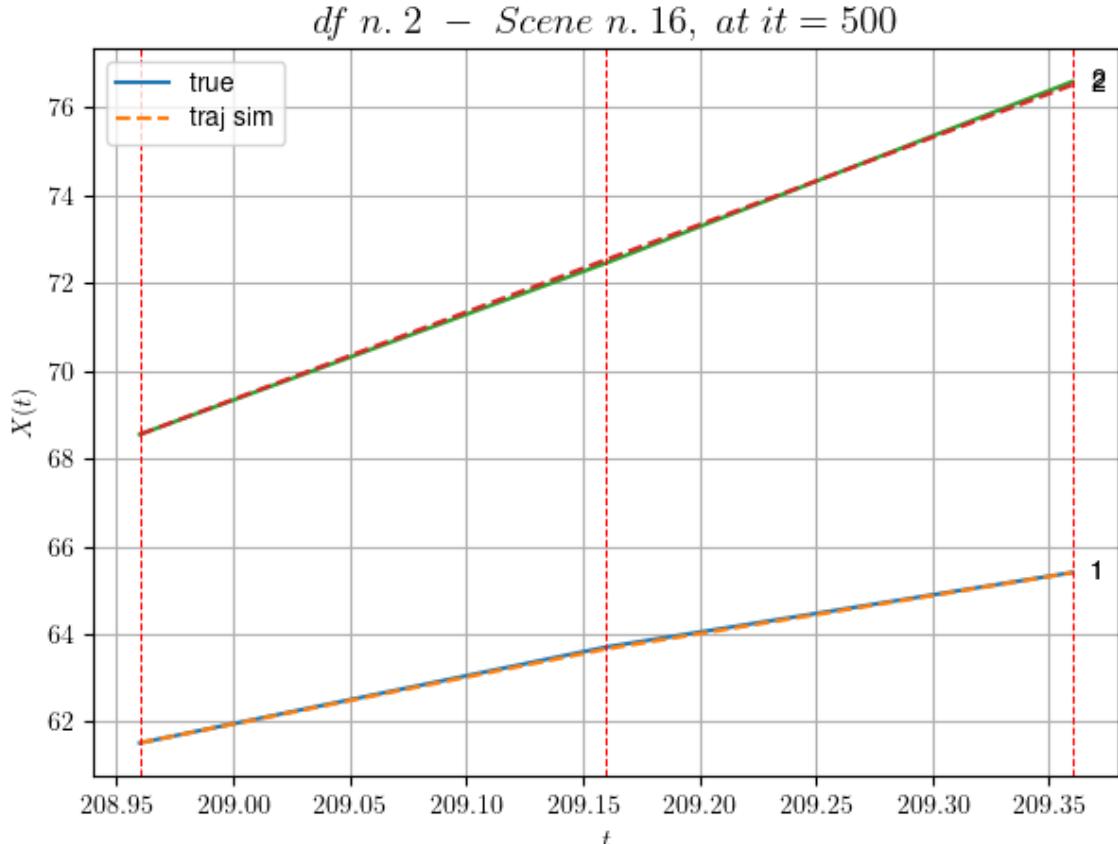


For scene 21/46:

* After LR finder: LR_NN=0.0005 with mse=8.568096798539912
at it=24
* v0 = 23.39910333176452
* MSE = 0.4764890593138616
* iterations = 500

DataFrame n.2. Scene n.22/46

We have 2 time intervals inside [208.96,209.36]

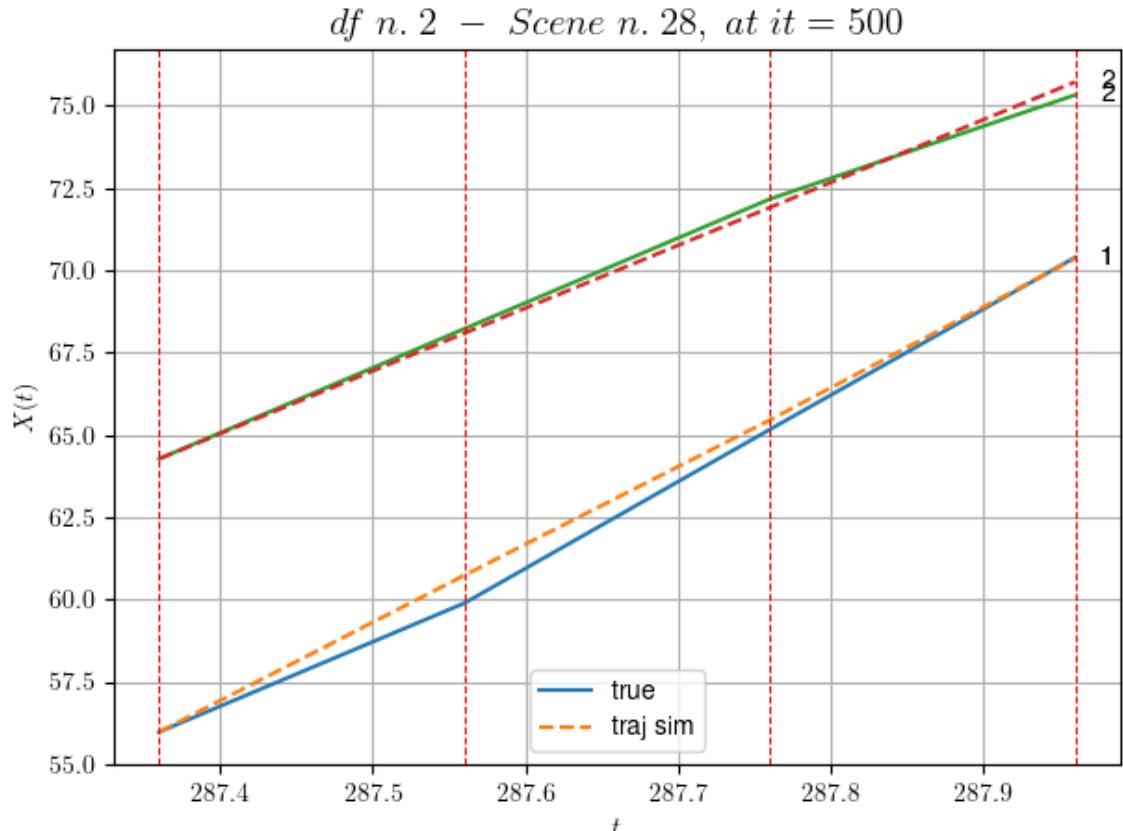


For scene 22/46:

* After LR finder: LR_NN=0.0005 with mse=3.3930717219460282
at it=24
* v0 = 19.925309614241876
* MSE = 0.0022764290351775535
* iterations = 500

DataFrame n.2. Scene n.23/46

We have 3 time intervals inside [287.36,287.96]

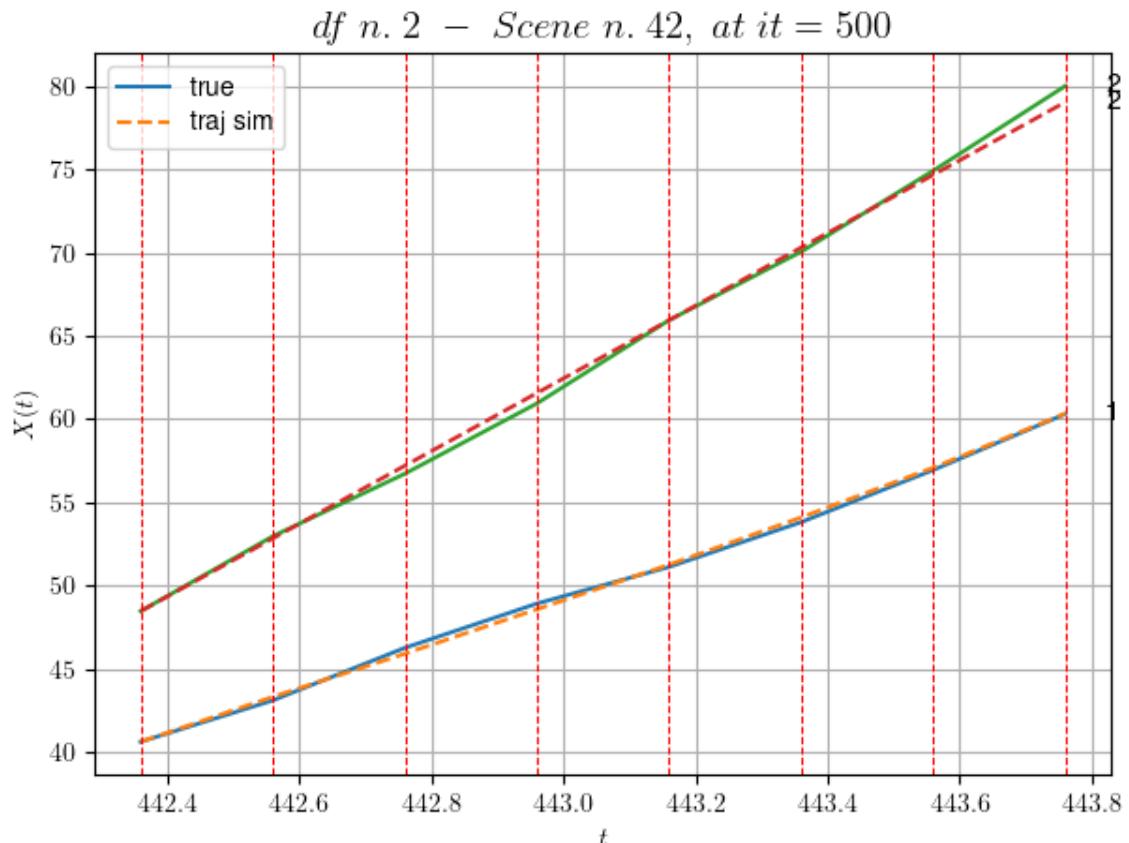


For scene 23/46:

* After LR finder: LR_NN=0.0001 with mse=8.89102686973214 at it=24
* $v_0 = 19.081744094339726$
* MSE = 0.1302811274139103
* iterations = 500

DataFrame n.2. Scene n.24/46

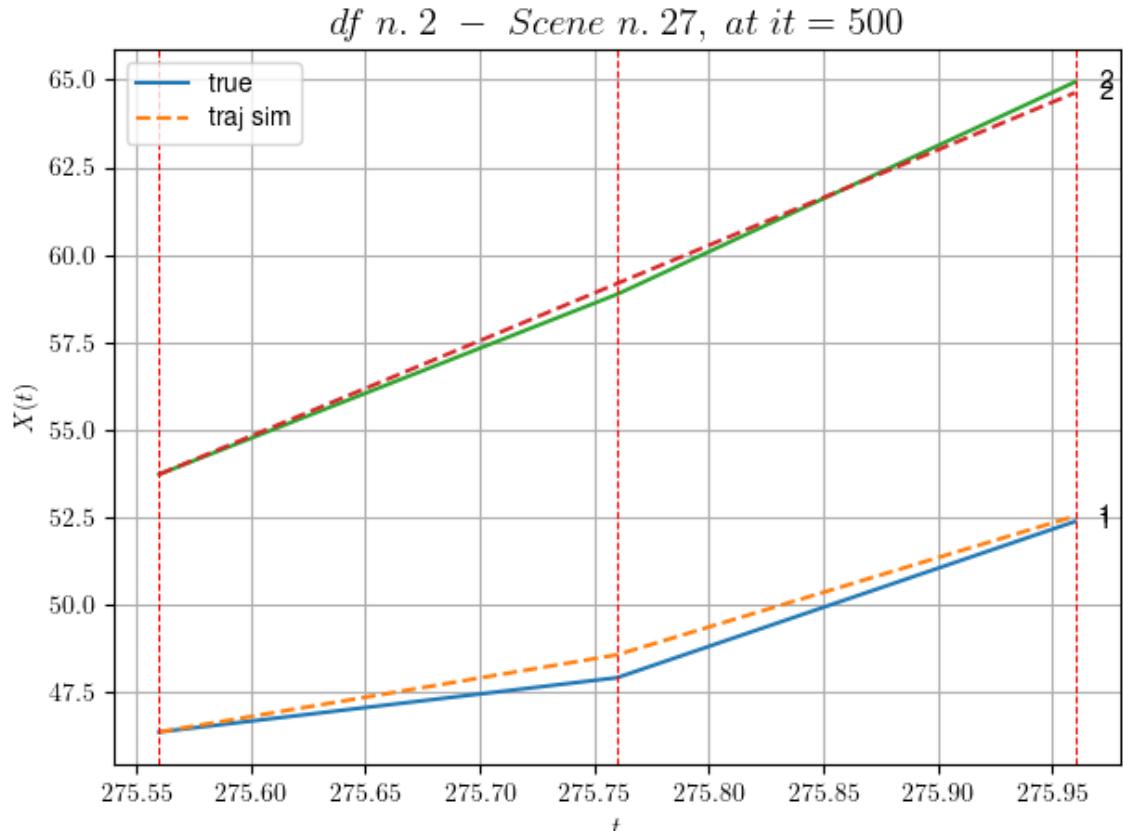
We have 7 time intervals inside [442.36,443.76]



For scene 24/46:
* After LR finder: LR_NN=0.001 with mse=23.21197399942138 at
it=24
* v0 = 21.85795817065097
* MSE = 0.132316108757117
* iterations = 500

DataFrame n.2. Scene n.25/46

We have 2 time intervals inside [275.56,275.96]

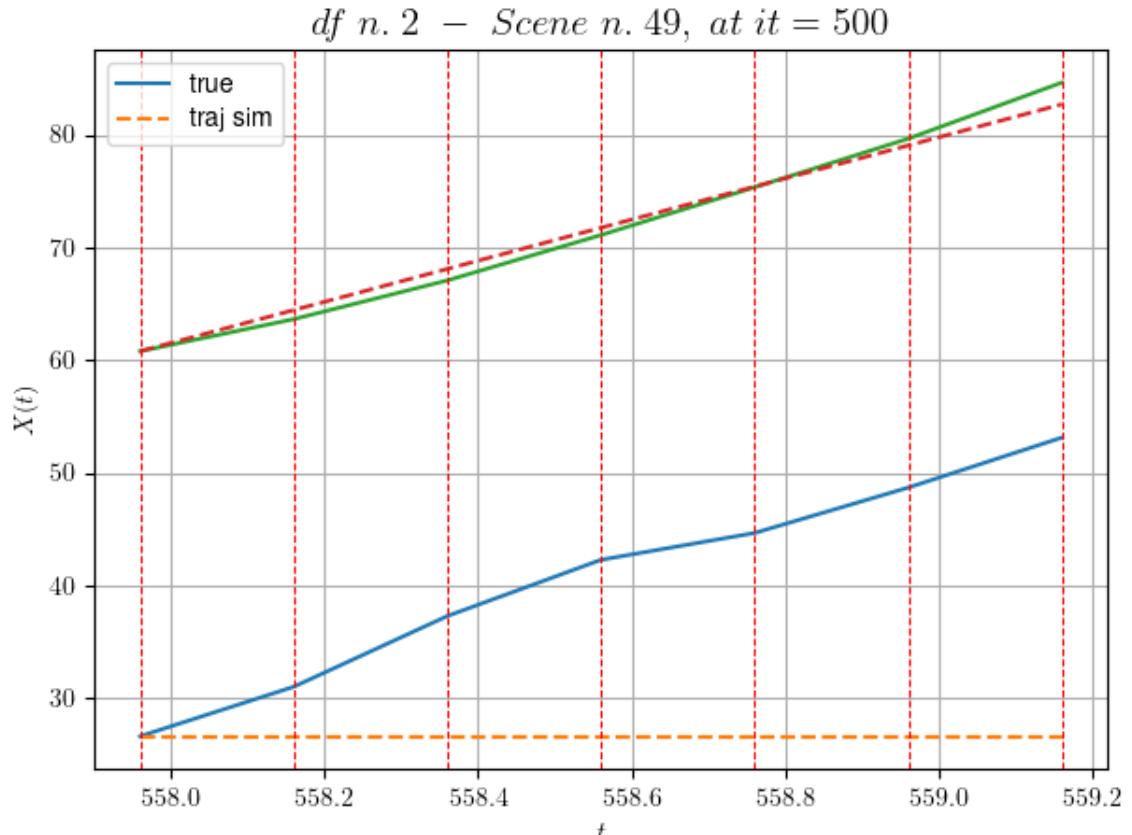


For scene 25/46:

* After LR finder: LR_NN=0.0001 with mse=0.3792756205391566
4 at it=24
* v0 = 27.245148829197323
* MSE = 0.1065350398294378
* iterations = 500

DataFrame n.2. Scene n.26/46

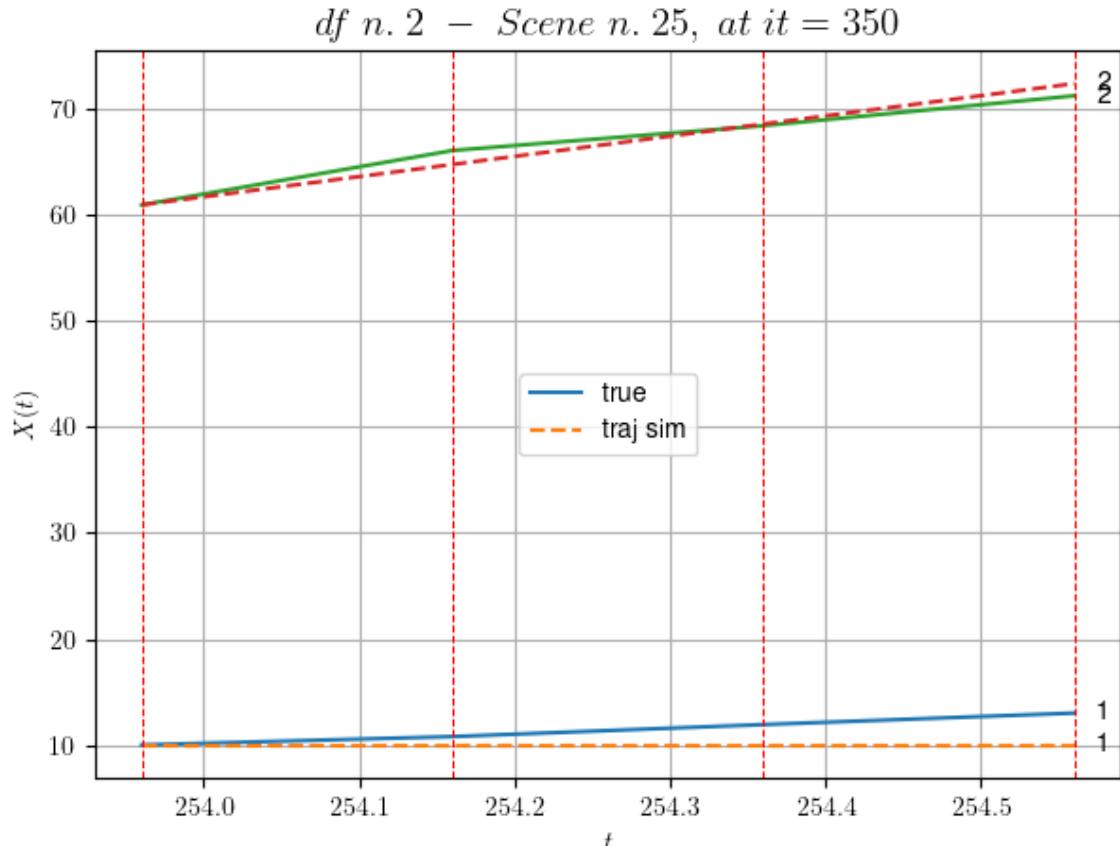
We have 6 time intervals inside [557.96,559.16]



For scene 26/46:
* After LR finder: LR_NN=0.0005 with mse=33.44412242044361
at it=24
* v0 = 18.265989604985872
* MSE = 71.65067522744195
* iterations = 500

DataFrame n.2. Scene n.27/46

We have 3 time intervals inside [253.96, 254.56]

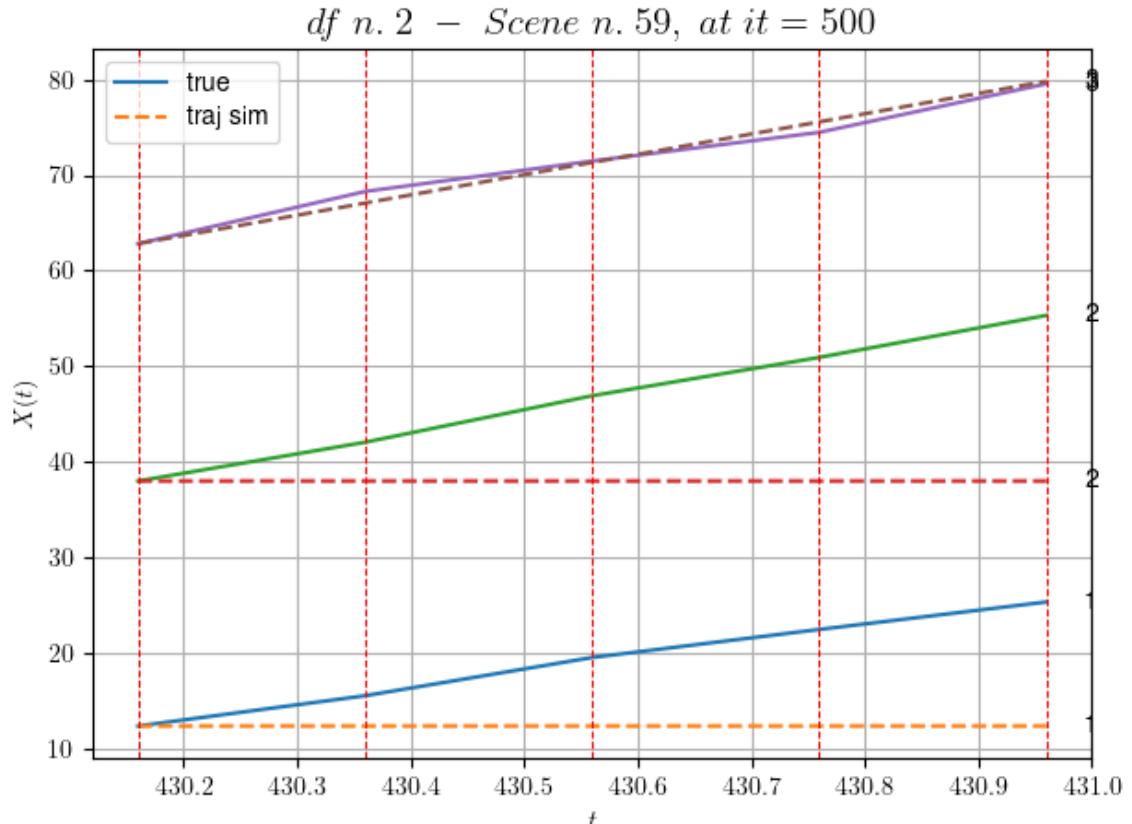


For scene 27/46:

* After LR finder: LR_NN=5e-05 with mse=10.11510328699046 at it=24
* v0 = 19.05988449300904
* MSE = 2.056104824092025
* iterations = 350

DataFrame n.2. Scene n.28/46

We have 4 time intervals inside [430.16,430.96]

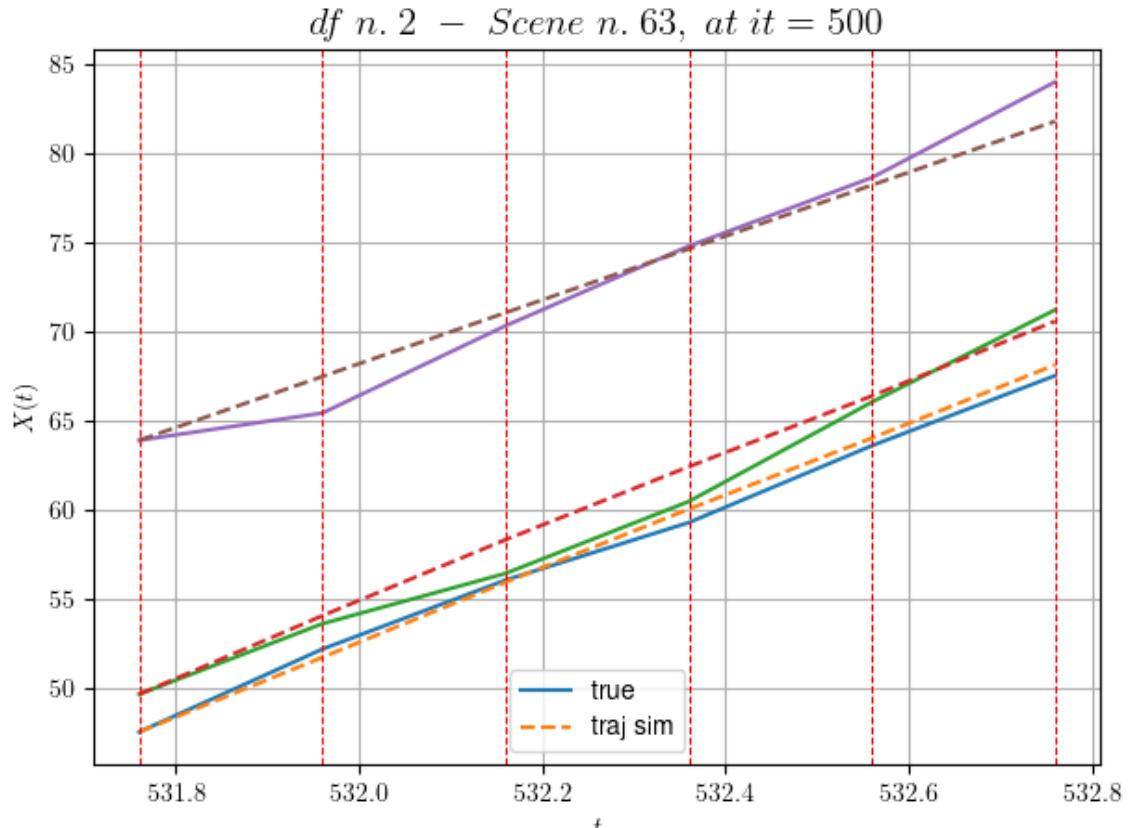


For scene 28/46:

* After LR finder: LR_NN=5e-05 with mse=8.634442588113501 at it=24
* v0 = 21.236902740721366
* MSE = 59.851564194379314
* iterations = 500

DataFrame n.2. Scene n.29/46

We have 5 time intervals inside [531.76,532.76]

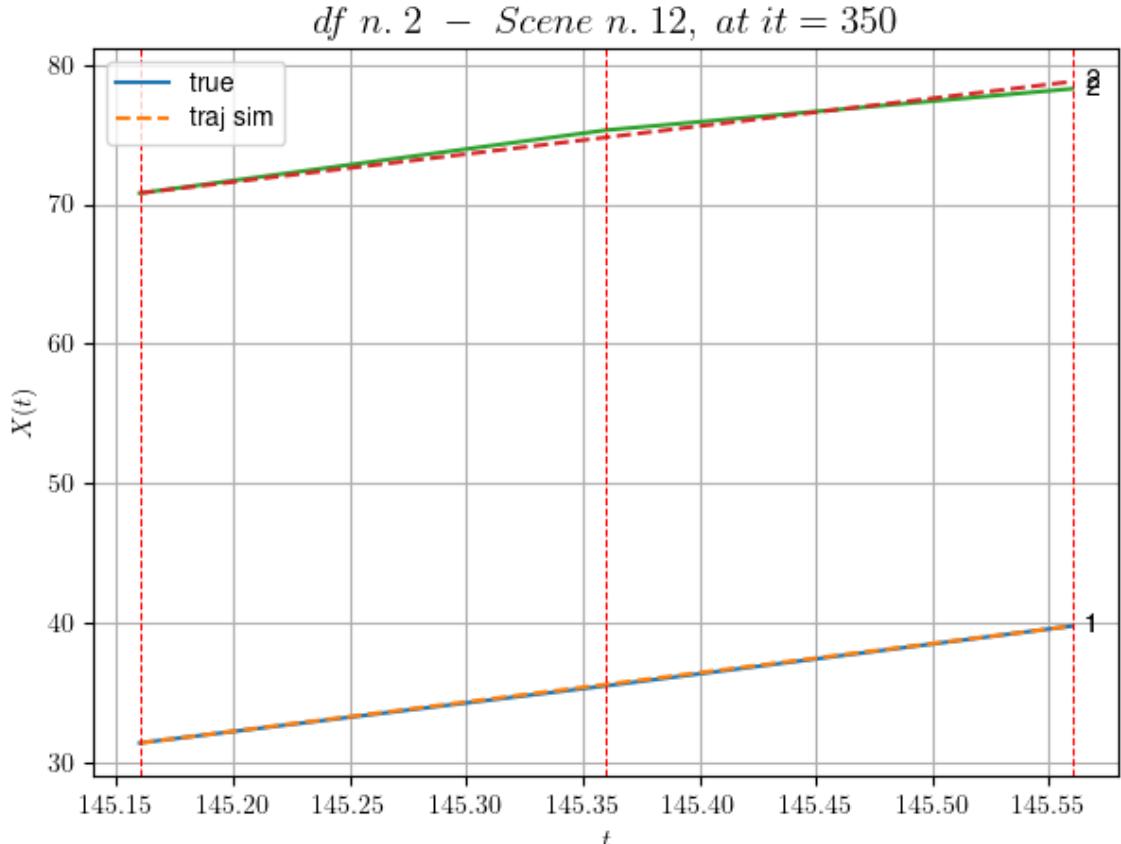


For scene 29/46:

* After LR finder: LR_NN=0.001 with mse=30.94728912580179 at it=24
* $v_0 = 17.91173132808042$
* MSE = 1.064539614444796
* iterations = 500

DataFrame n.2. Scene n.30/46

We have 2 time intervals inside [145.16,145.56]

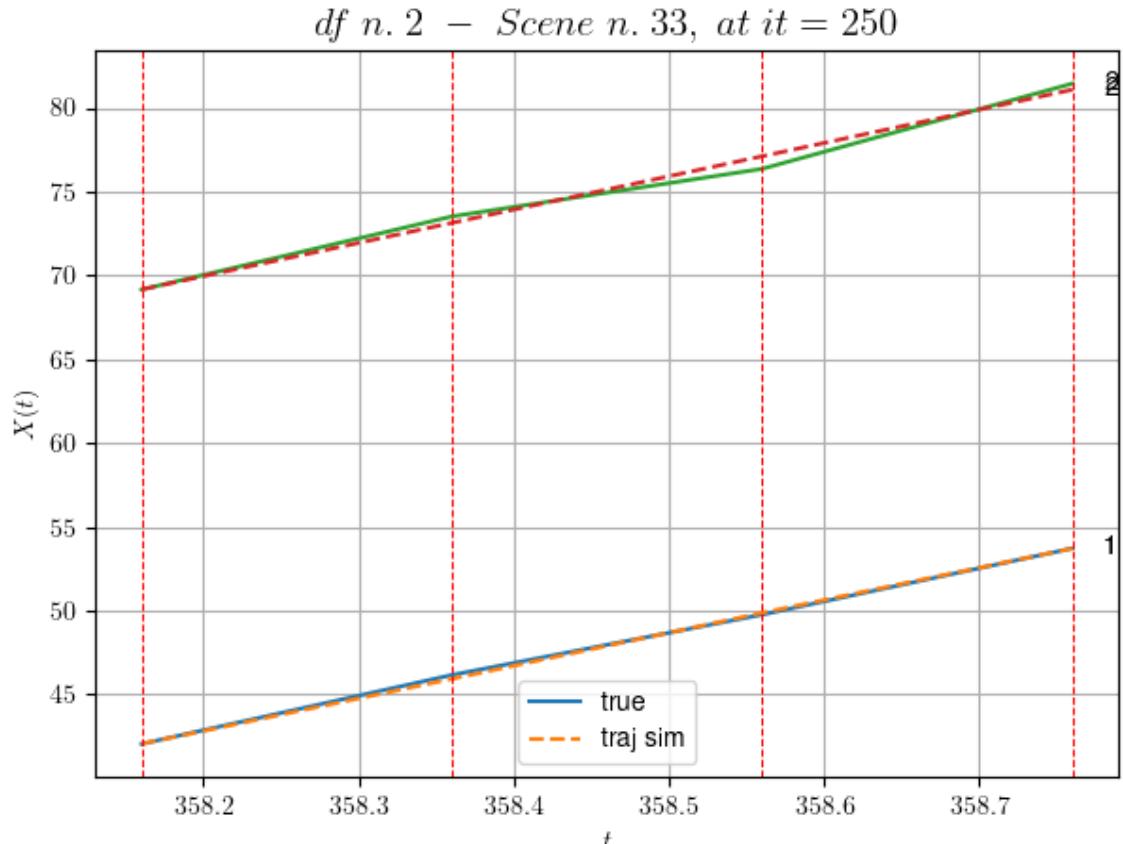


For scene 30/46:

* After LR finder: LR_NN=5e-05 with mse=3.7547249266488327
at it=24
* v0 = 20.018762484246604
* MSE = 0.09077123498945802
* iterations = 350

DataFrame n.2. Scene n.31/46

We have 3 time intervals inside [358.16,358.76]



For scene 31/46:

* After LR finder: LR_NN=0.0001 with mse=7.297800115942805

at it=24

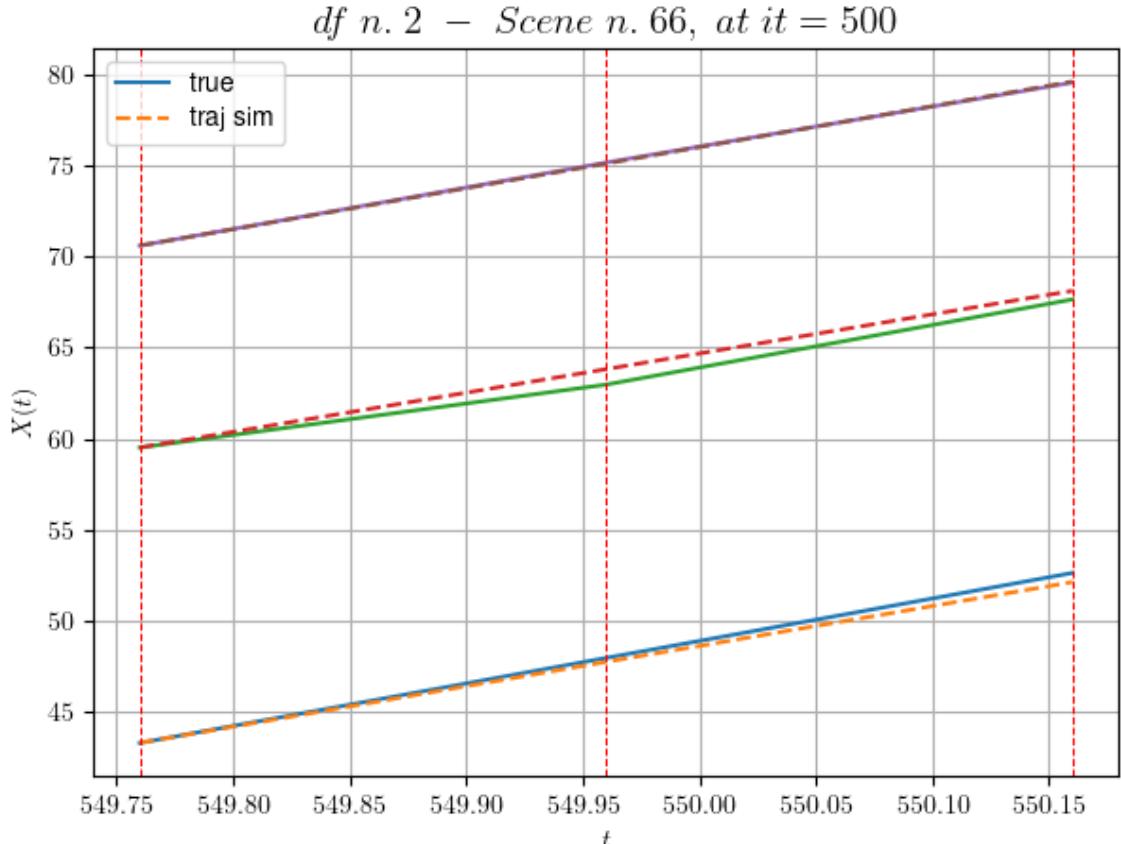
* v0 = 19.87712656027431

* MSE = 0.1135873129916653

* iterations = 250

DataFrame n.2. Scene n.32/46

We have 2 time intervals inside [549.76,550.16]

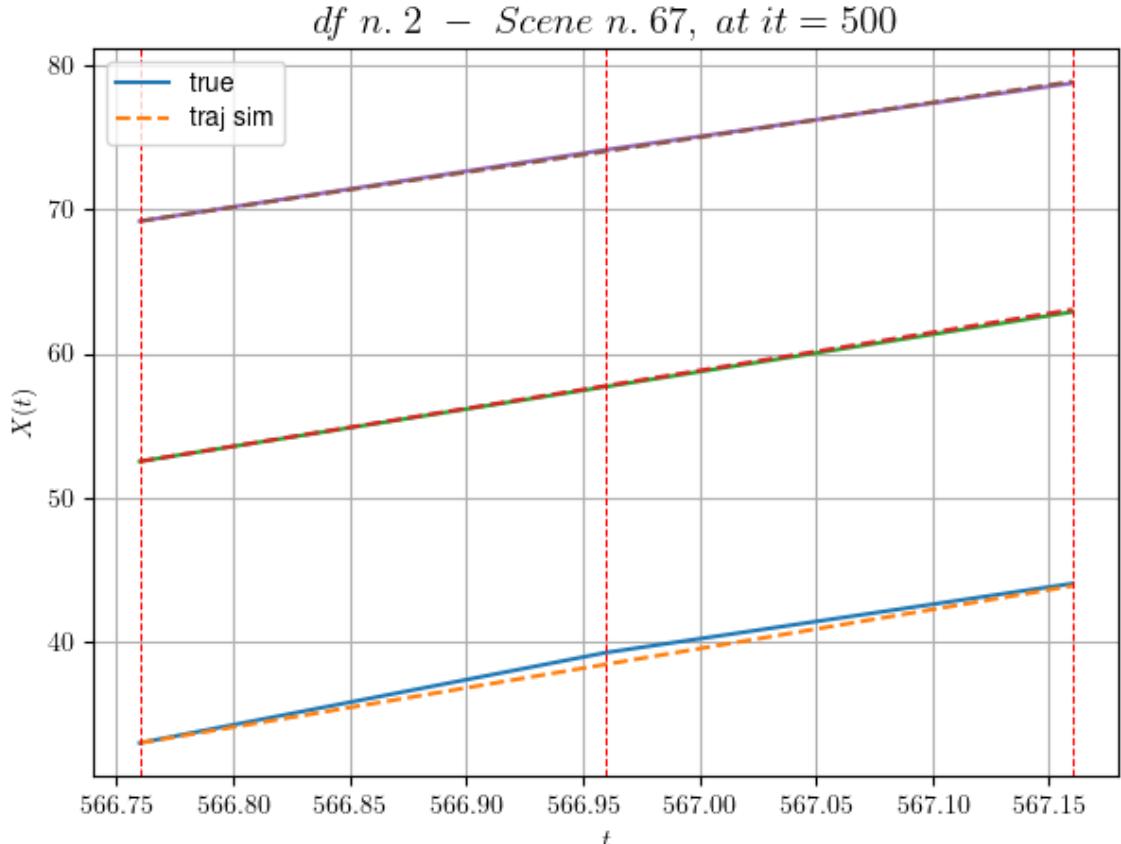


For scene 32/46:

* After LR finder: LR_NN=0.0001 with mse=1.369907035097338
at it=24
* v0 = 22.49571952540844
* MSE = 0.12307486241461087
* iterations = 500

DataFrame n.2. Scene n.33/46

We have 2 time intervals inside [566.76,567.16]

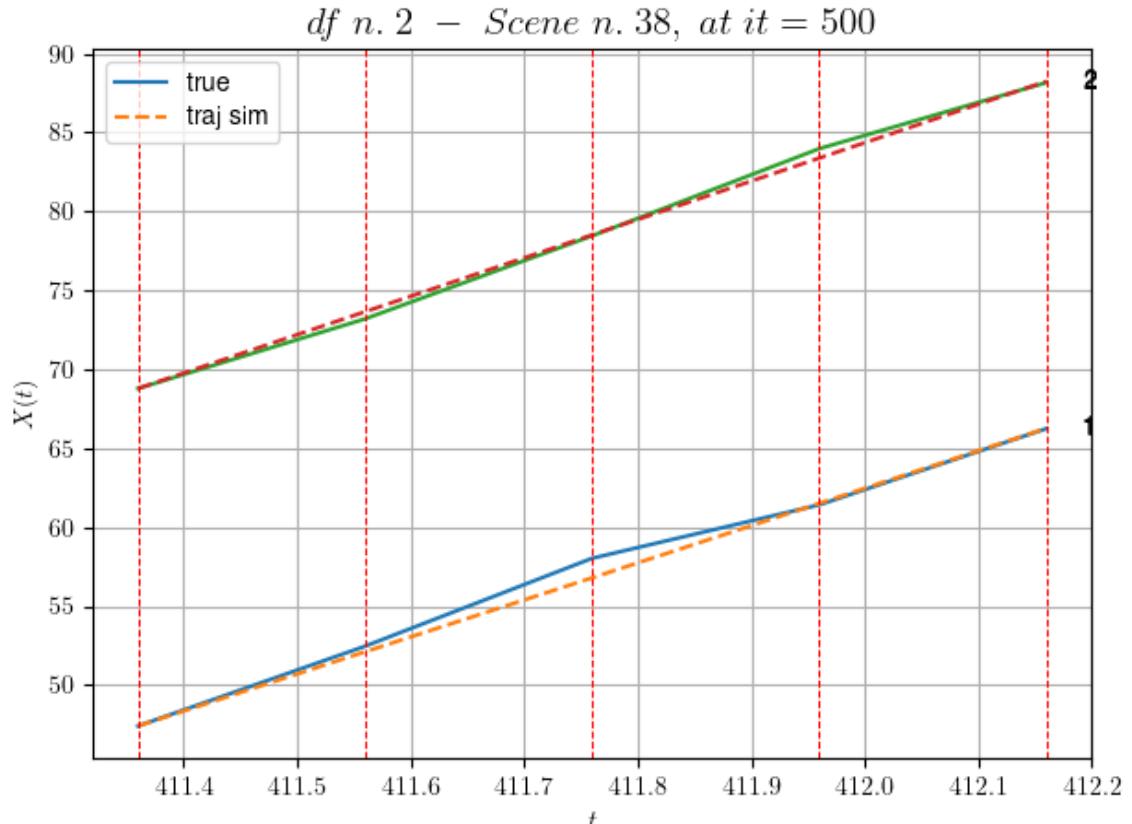


For scene 33/46:

* After LR finder: LR_NN=0.0001 with mse=0.8376949287830359
at it=24
* v0 = 24.222520391149725
* MSE = 0.08228116427376679
* iterations = 500

DataFrame n.2. Scene n.34/46

We have 4 time intervals inside [411.36,412.16]

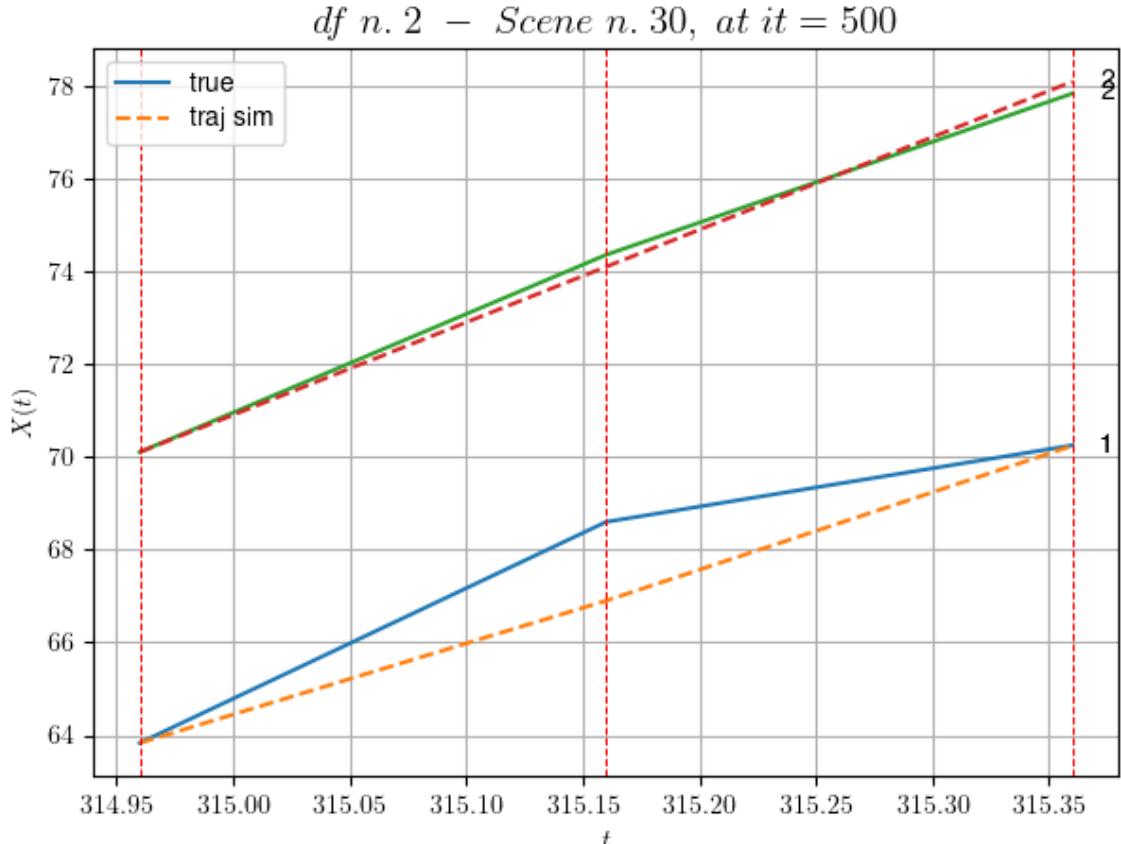


For scene 34/46:

- * After LR finder: LR_NN=5e-05 with mse=3.9031123564528896
- at it=24
 - * v0 = 24.337743181531415
 - * MSE = 0.22224567589715716
 - * iterations = 500

DataFrame n.2. Scene n.35/46

We have 2 time intervals inside [314.96,315.36]

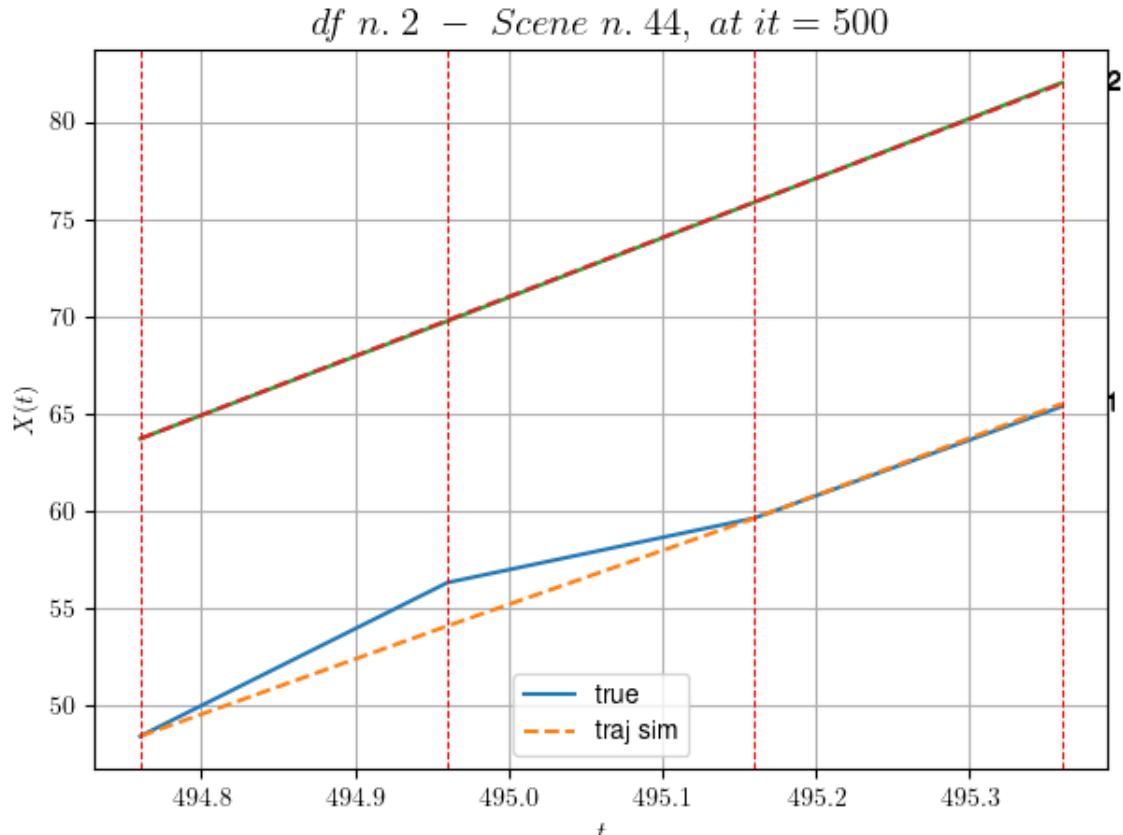


For scene 35/46:

* After LR finder: LR_NN=0.0005 with mse=3.954708867362682
at it=24
* v0 = 19.975403002157083
* MSE = 0.49814159046298045
* iterations = 500

DataFrame n.2. Scene n.36/46

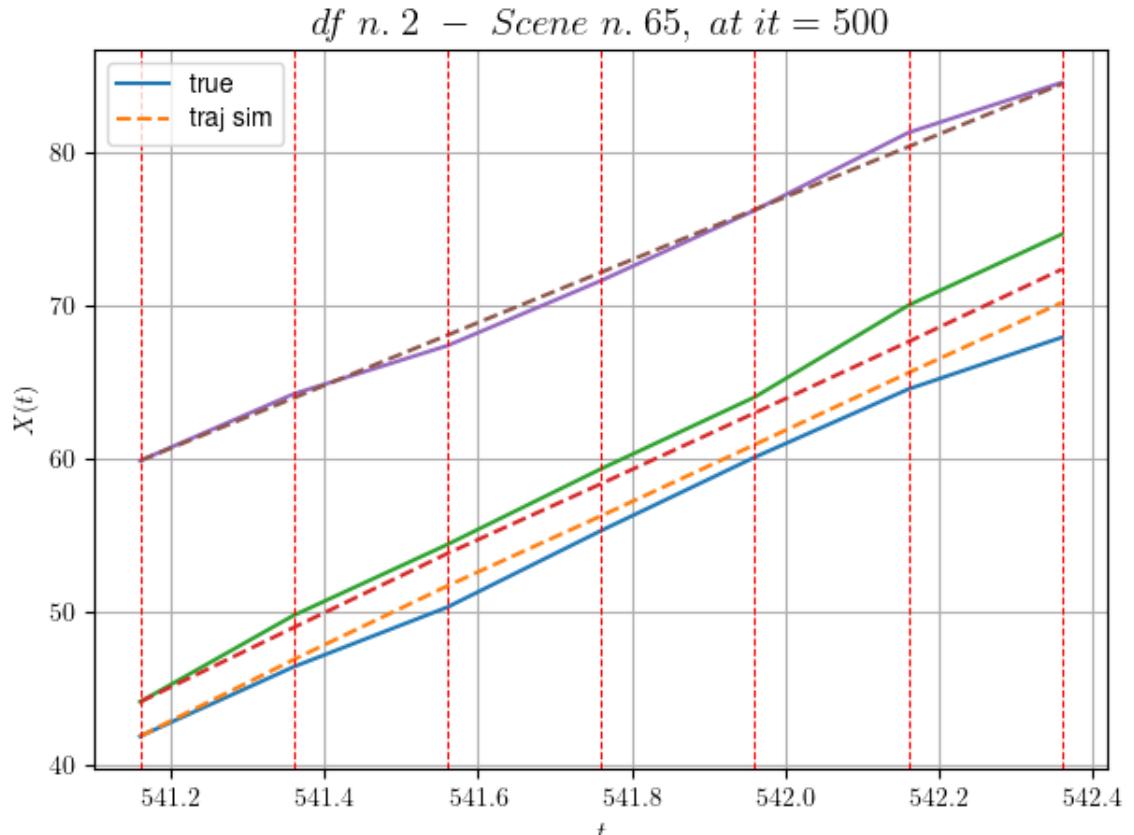
We have 3 time intervals inside [494.76,495.36]



For scene 36/46:
* After LR finder: LR_NN=0.0001 with mse=0.6461340741253245
at it=24
* v0 = 30.442979864262664
* MSE = 0.6166572480962035
* iterations = 500

DataFrame n.2. Scene n.37/46

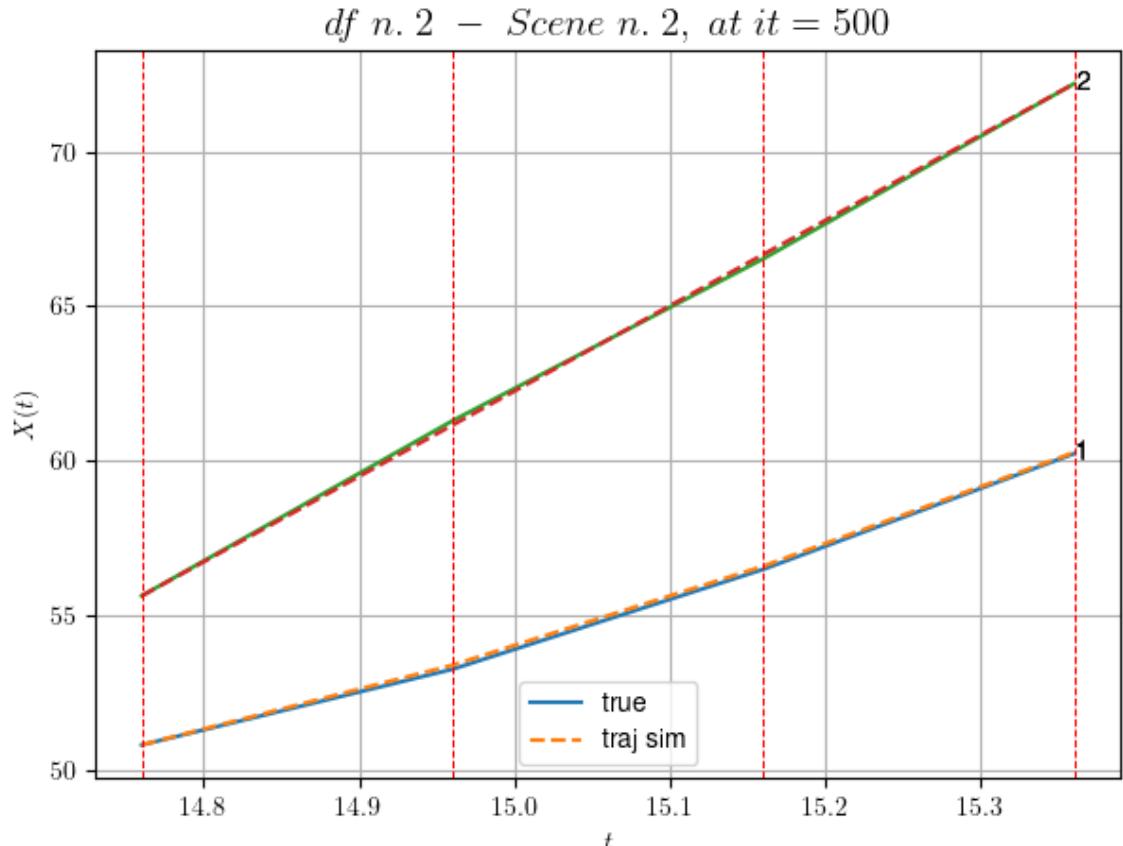
We have 6 time intervals inside [541.16,542.36]



For scene 37/46:
* After LR finder: LR_NN=0.001 with mse=30.304815824001963
at it=24
* v0 = 20.489990975467446
* MSE = 1.2124526075773059
* iterations = 500

DataFrame n.2. Scene n.38/46

We have 3 time intervals inside [14.76,15.36]

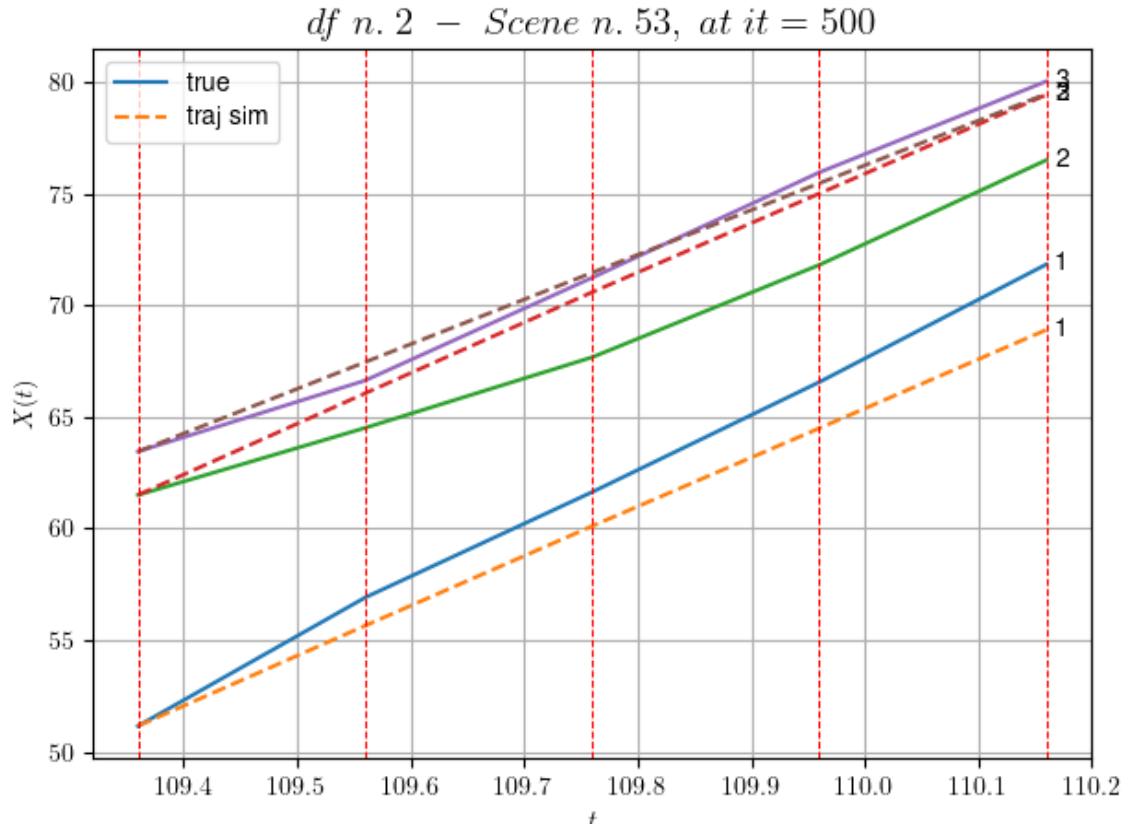


For scene 38/46:

* After LR finder: LR_NN=0.001 with mse=0.5374679720689144
at it=24
* v0 = 27.615406088656982
* MSE = 0.008597699852155503
* iterations = 500

DataFrame n.2. Scene n.39/46

We have 4 time intervals inside [109.36,110.16]

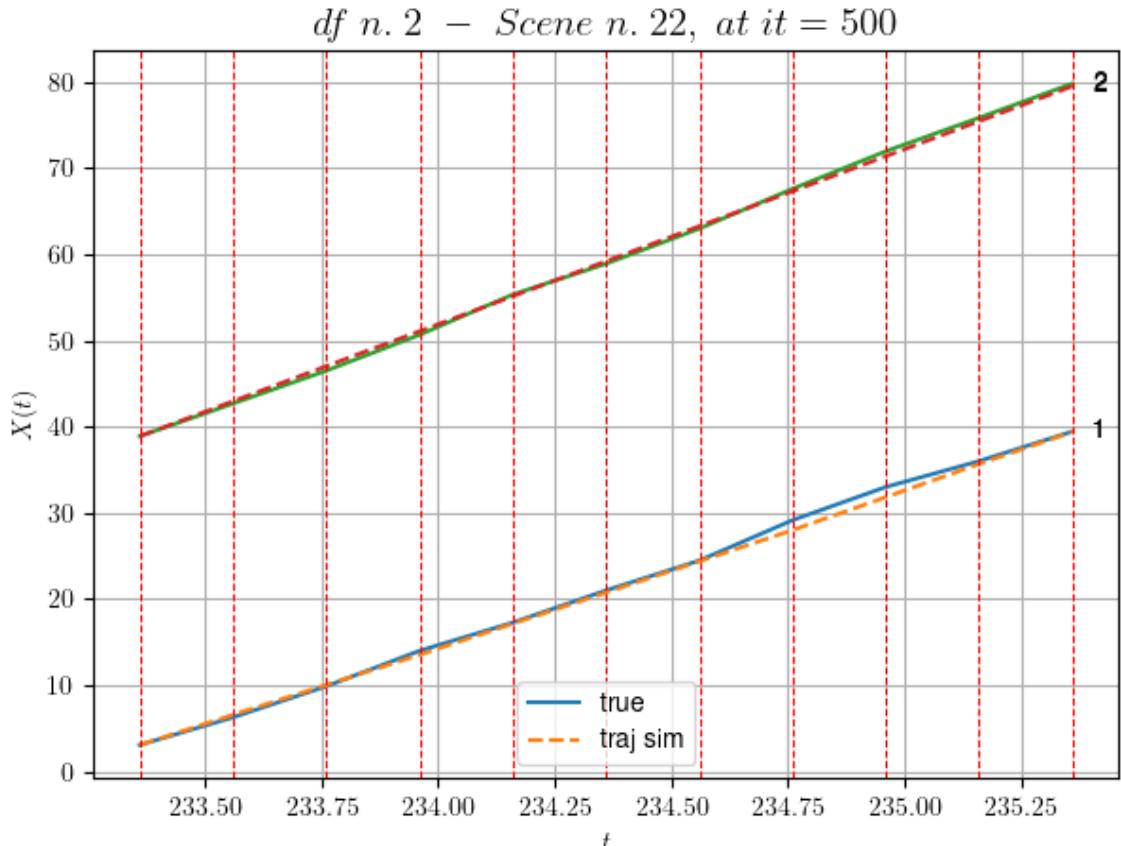


For scene 39/46:

* After LR finder: LR_NN=0.0005 with mse=10.313414928208841
at it=24
* v0 = 20.033858704331454
* MSE = 1.7612163629128172
* iterations = 500

DataFrame n.2. Scene n.40/46

We have 10 time intervals inside [233.36, 235.36]

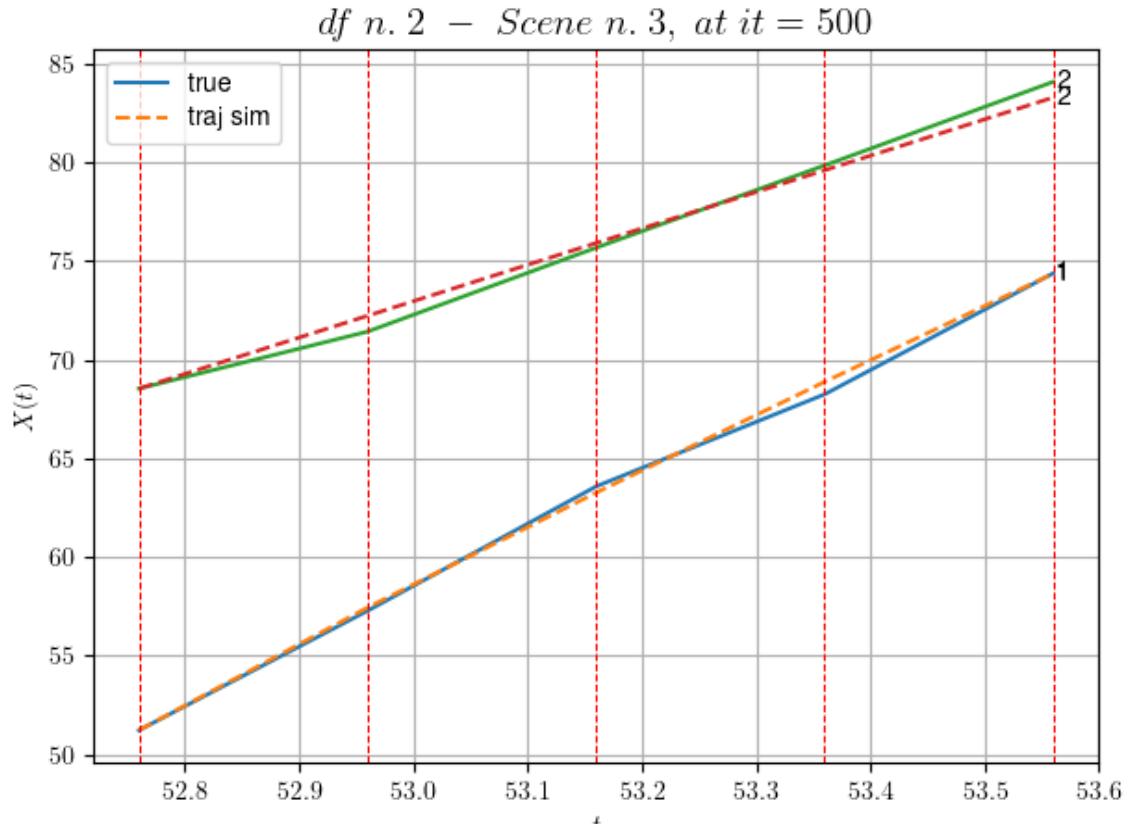


For scene 40/46:

* After LR finder: LR_NN=0.0005 with mse=64.59362173514911
at it=24
* $v_0 = 20.300783427084287$
* MSE = 0.19505350837477606
* iterations = 500

DataFrame n.2. Scene n.41/46

We have 4 time intervals inside [52.76,53.56]

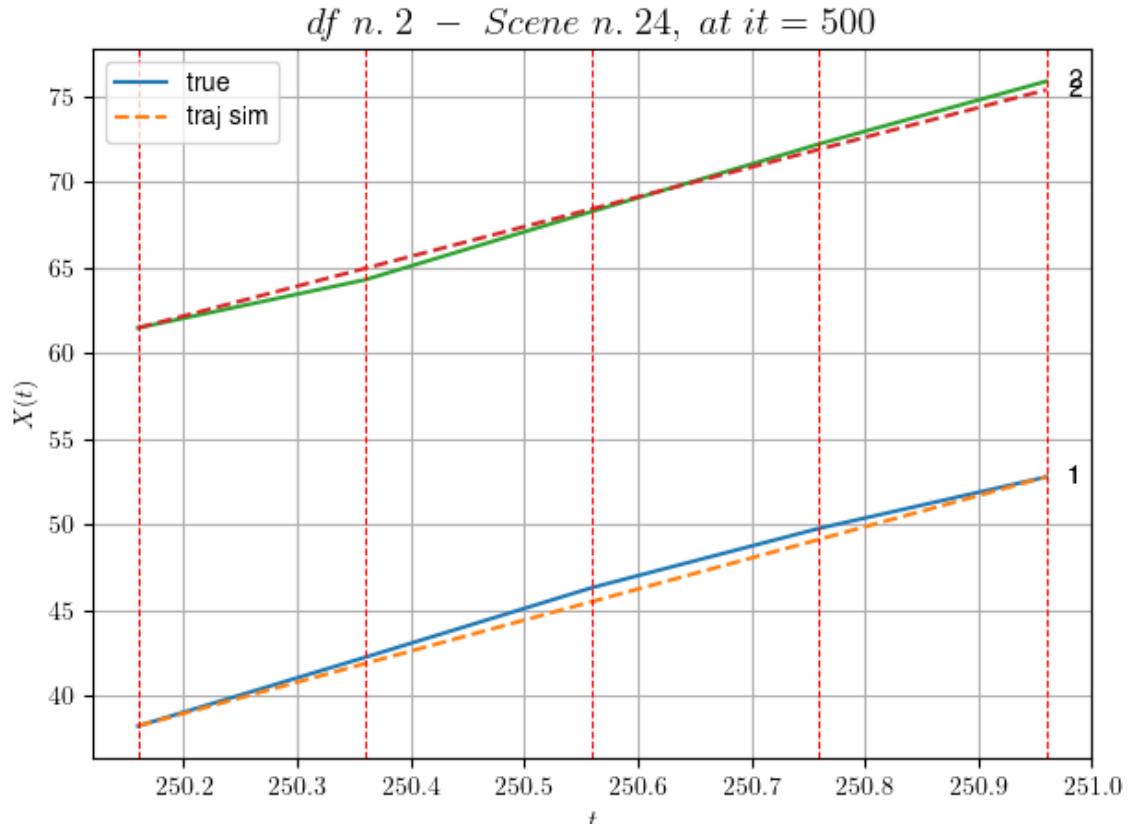


For scene 41/46:

- * After LR finder: LR_NN=0.0001 with mse=15.27203162853306
- at it=24
 - * v0 = 18.43493729530433
 - * MSE = 0.17181963785552395
 - * iterations = 500

DataFrame n.2. Scene n.42/46

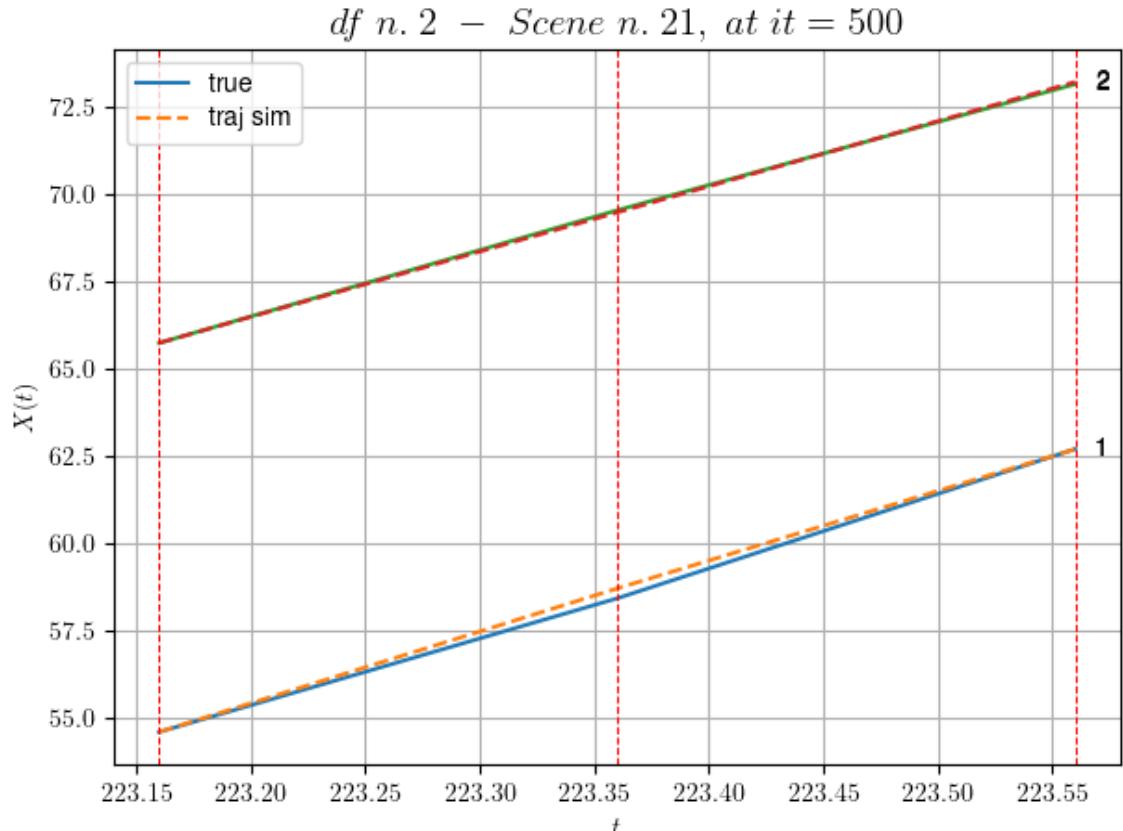
We have 4 time intervals inside [250.16, 250.96]



For scene 42/46:
* After LR finder: LR_NN=5e-05 with mse=18.355022069380844
at it=24
* v0 = 17.364515373912834
* MSE = 0.20148812131494748
* iterations = 500

DataFrame n.2. Scene n.43/46

We have 2 time intervals inside [223.16,223.56]

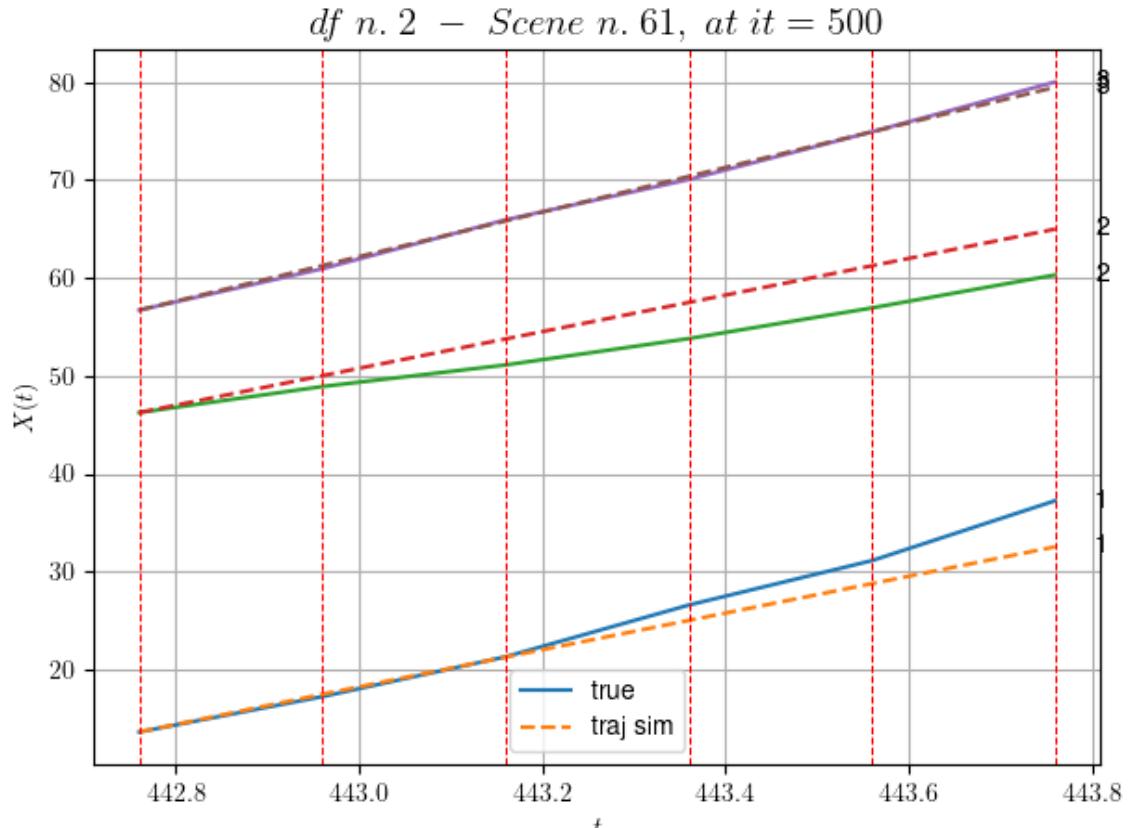


For scene 43/46:

* After LR finder: LR_NN=0.0005 with mse=4.320941184821527
at it=24
* v0 = 18.69837020534197
* MSE = 0.014310998783730605
* iterations = 500

DataFrame n.2. Scene n.44/46

We have 5 time intervals inside [442.76,443.76]

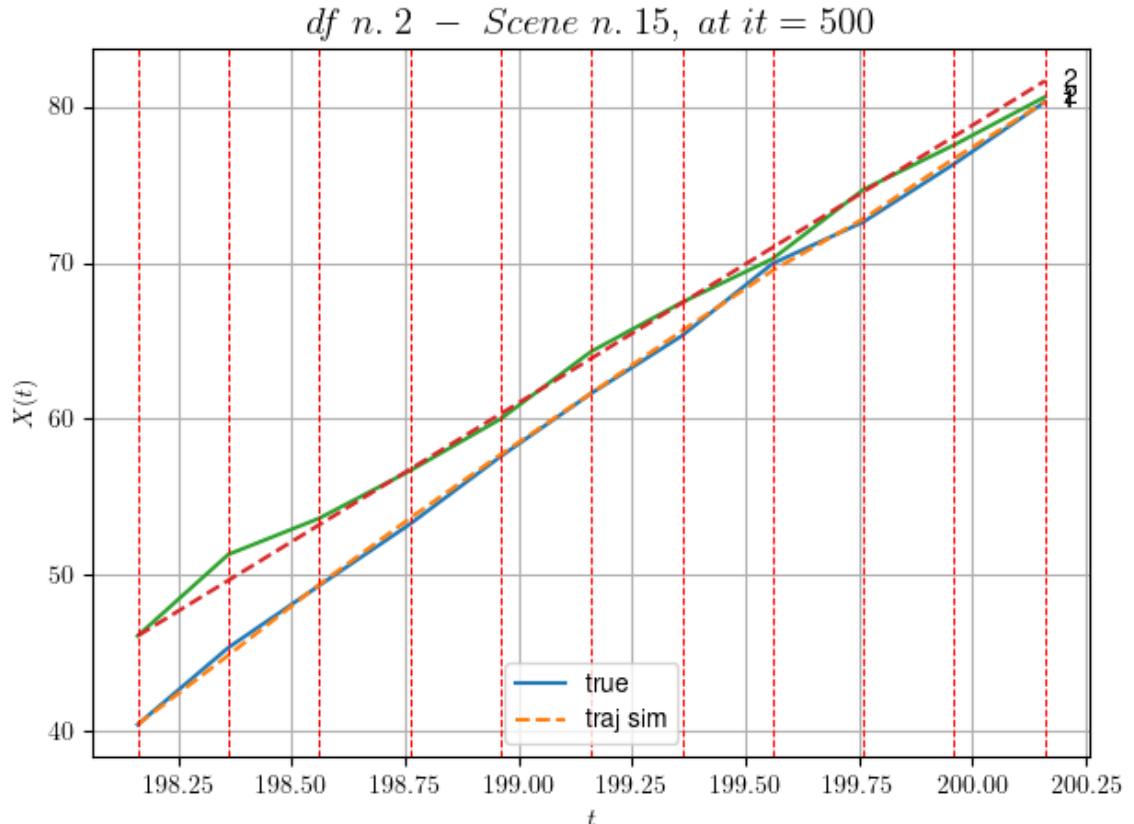


For scene 44/46:

* After LR finder: LR_NN=5e-05 with mse=7.923267347885571 at it=24
* $v_0 = 22.77589680250529$
* MSE = 5.13678131861814
* iterations = 500

DataFrame n.2. Scene n.45/46

We have 10 time intervals inside [198.16,200.16]

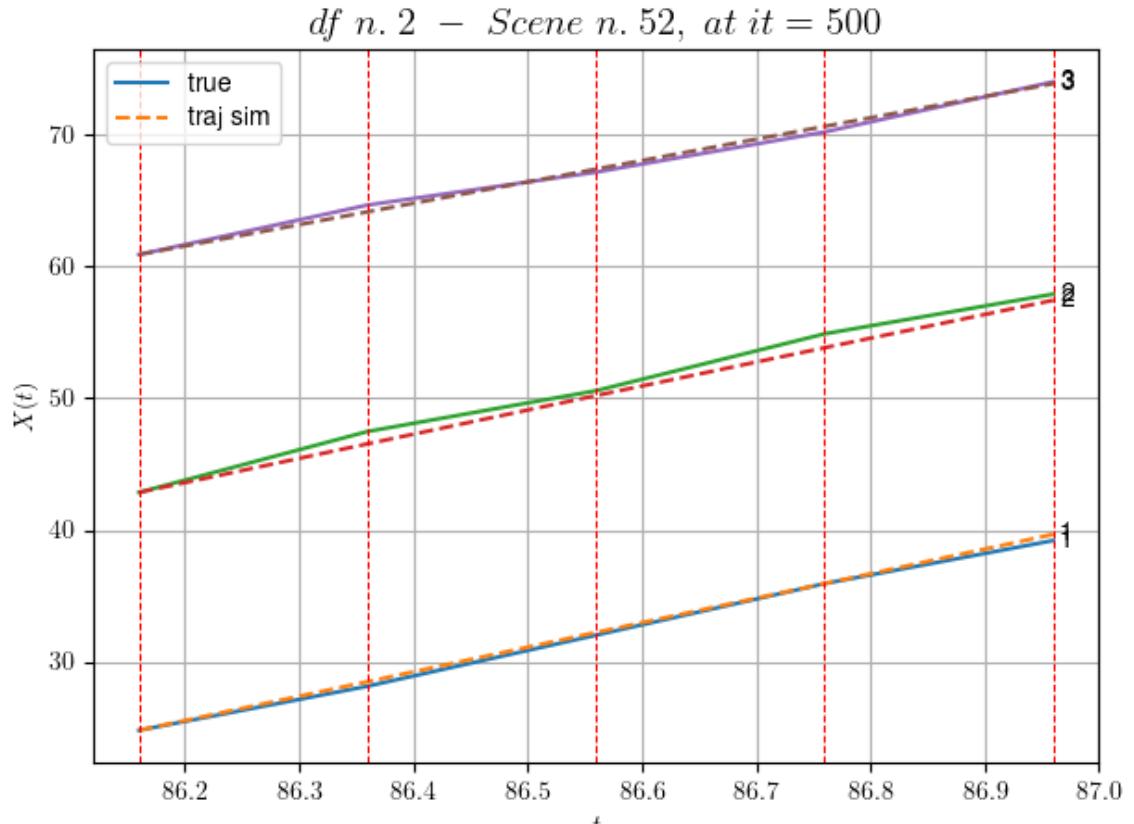


For scene 45/46:

* After LR finder: $LR_NN=0.001$ with $mse=109.28675184135467$
at it=24
* $v_0 = 17.75627925151302$
* $MSE = 0.2710455073553368$
* iterations = 500

DataFrame n.2. Scene n.46/46

We have 4 time intervals inside [86.16,86.96]



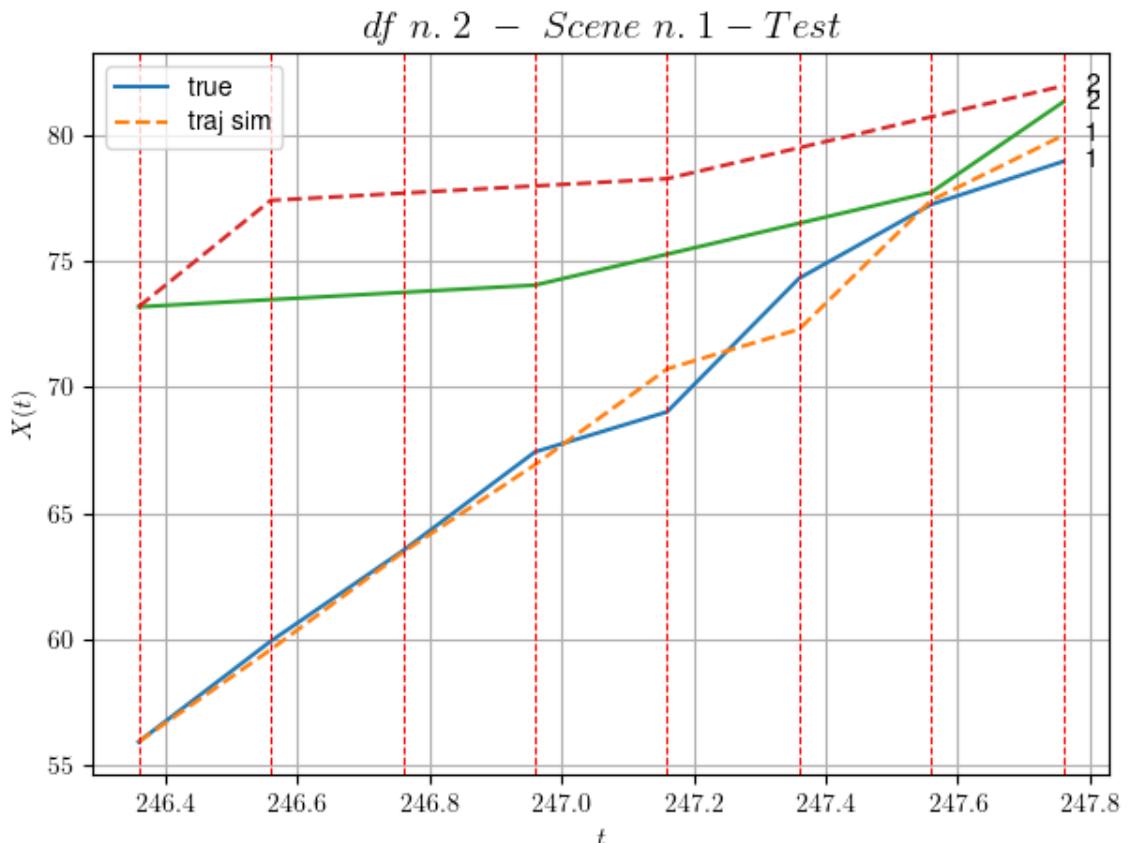
For scene 46/46:

* After LR finder: LR_NN=5e-05 with mse=15.854578900156065
at it=24
* vθ = 16.235330060145948
* MSE = 0.21687896261616313
* iterations = 500

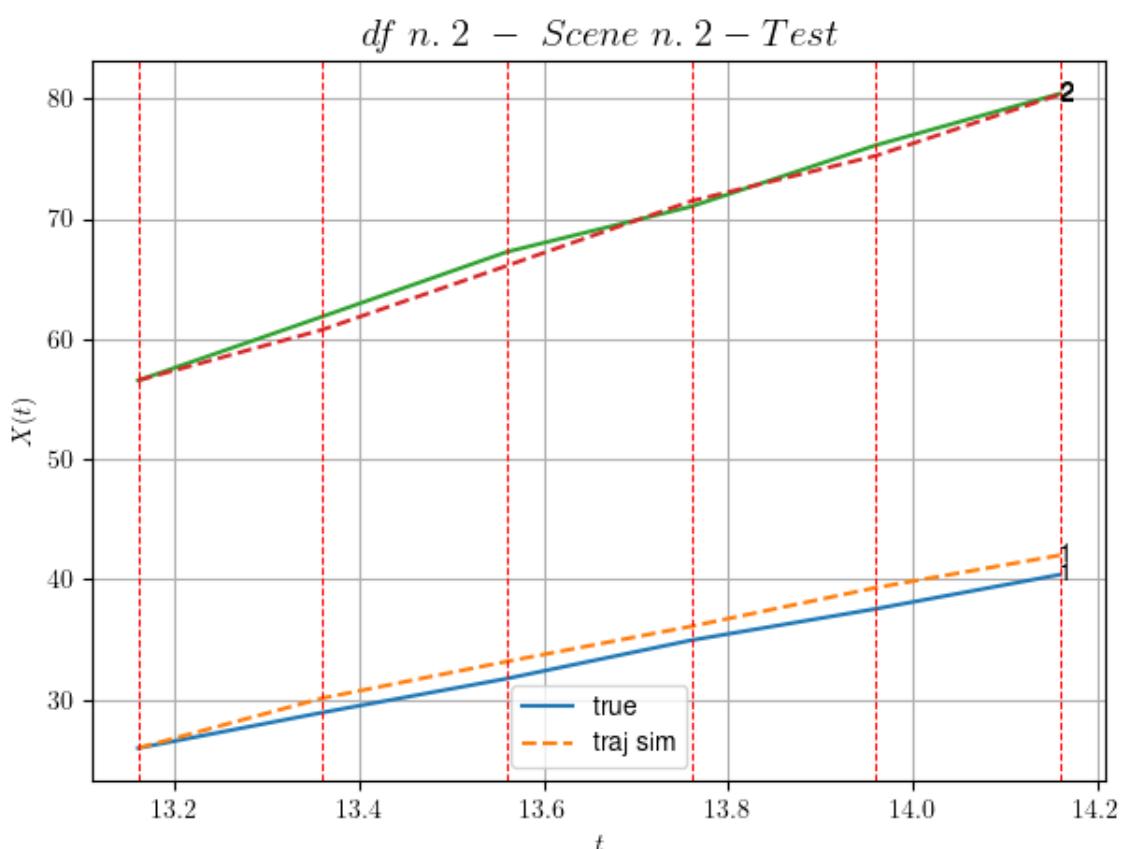
MSE train: 3.349489239487959

Testing step. (23 scenes)

DataFrame n.2. Scene n.1/23

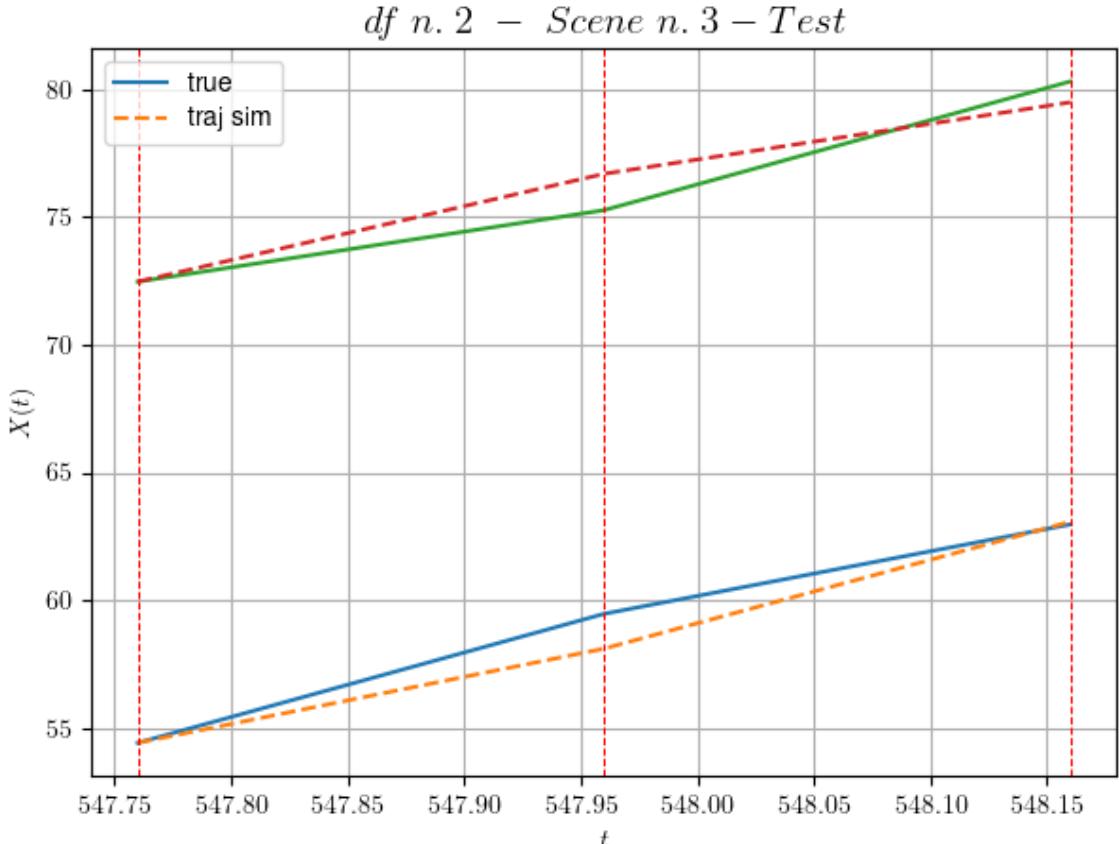


DataFrame n.2. Scene n.2/23



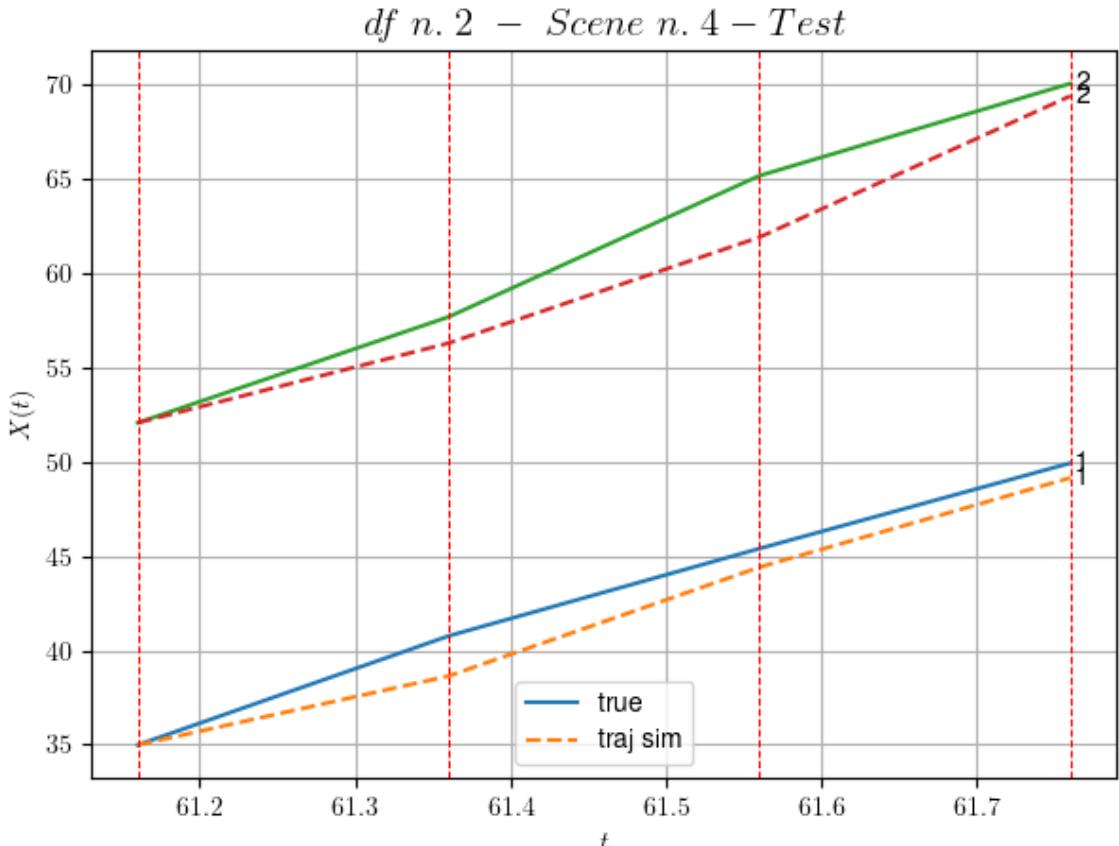
For scene 2/23:
* MSE = 1.1662110114392206

DataFrame n.2. Scene n.3/23



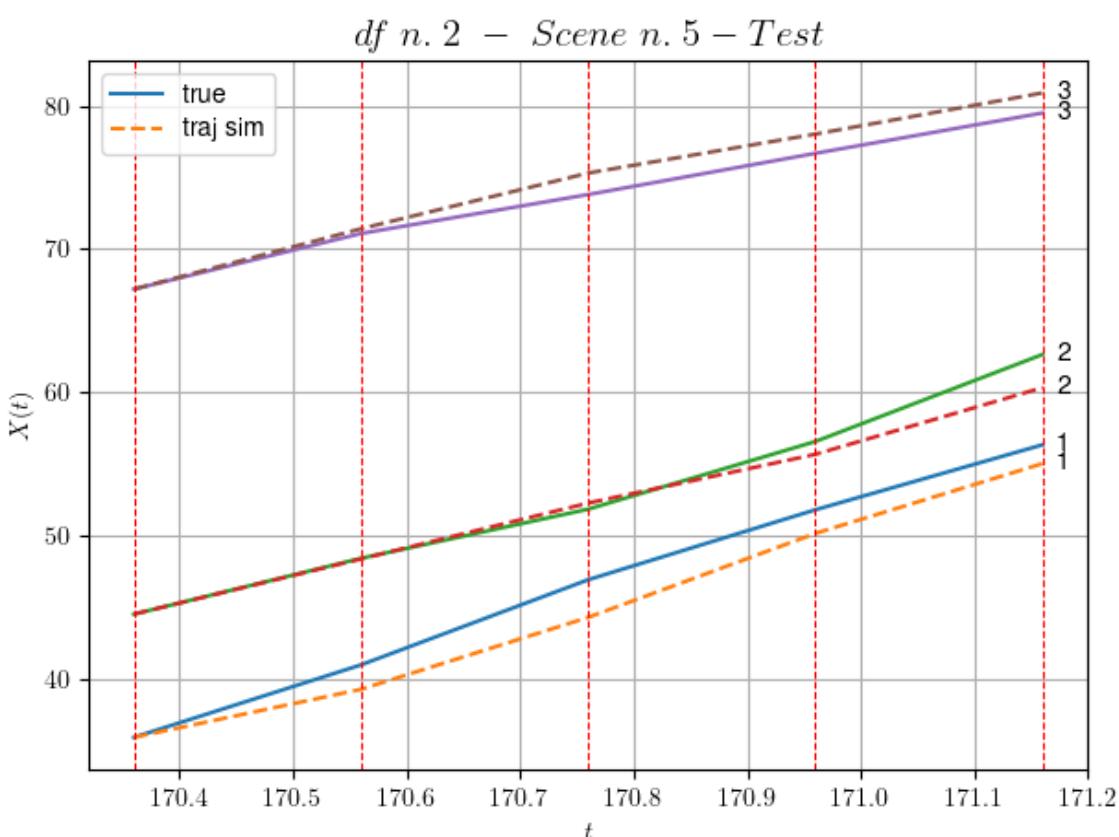
For scene 3/23:
* MSE = 0.7599218431711359

DataFrame n.2. Scene n.4/23



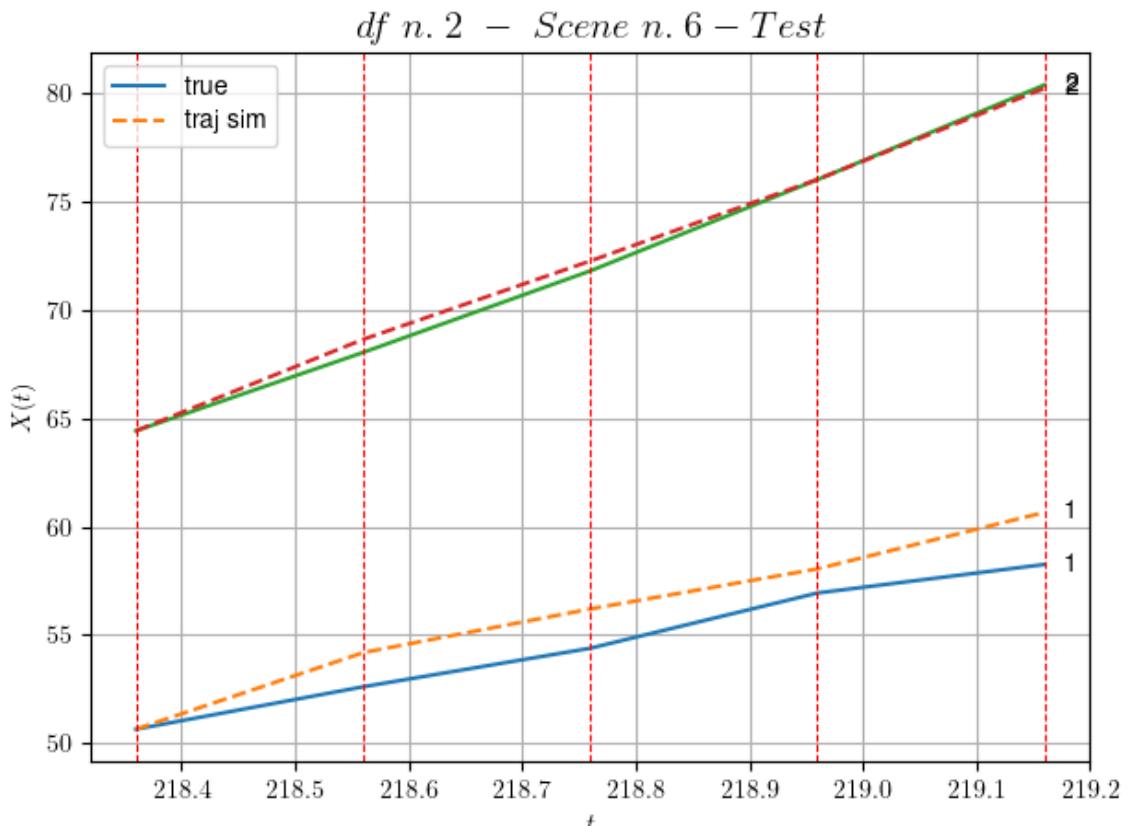
For scene 4/23:
* MSE = 2.389732173623297

DataFrame n.2. Scene n.5/23



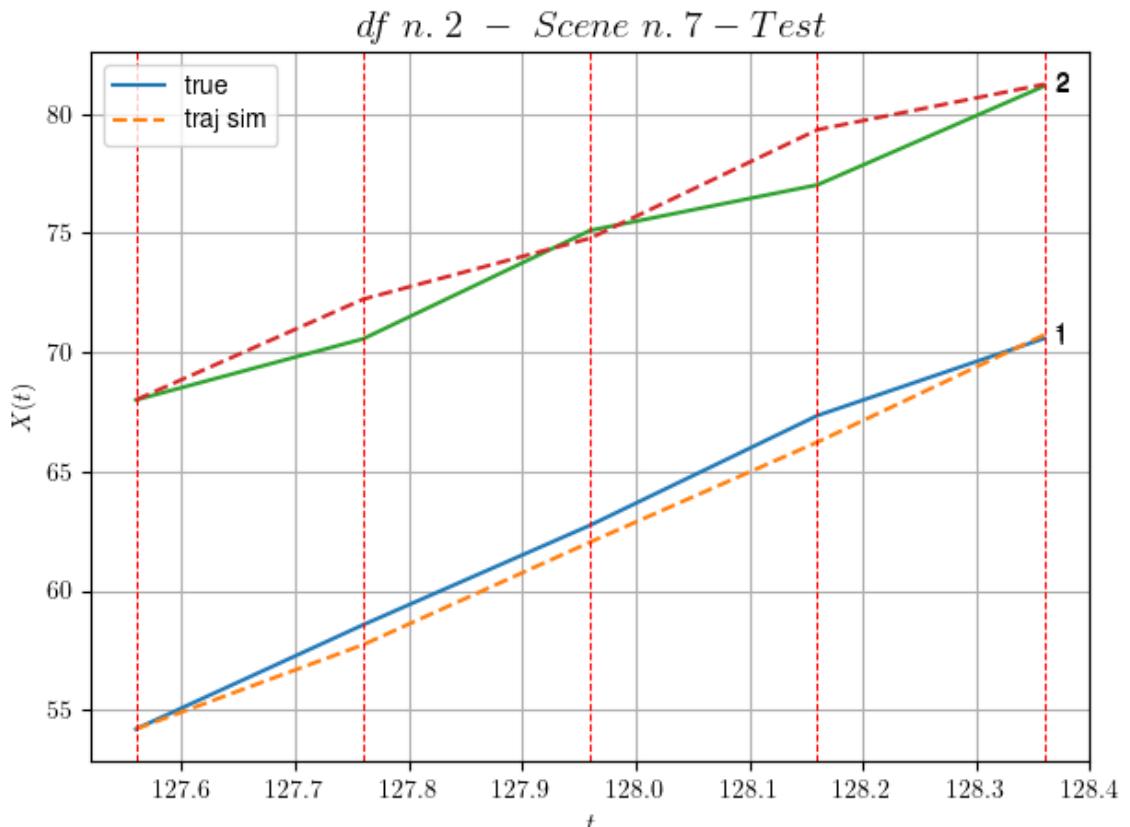
For scene 5/23:
* MSE = 1.7854744818645045

DataFrame n.2. Scene n.6/23



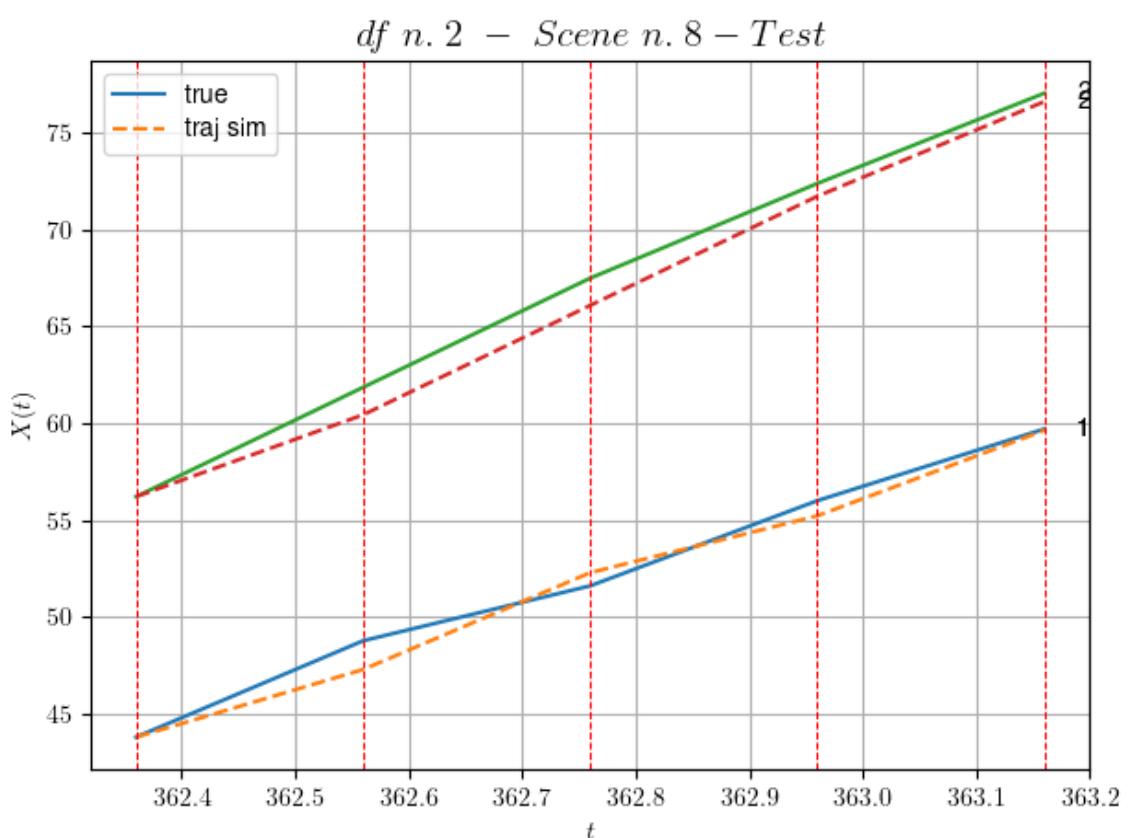
For scene 6/23:
* MSE = 1.3401747895621476

DataFrame n.2. Scene n.7/23



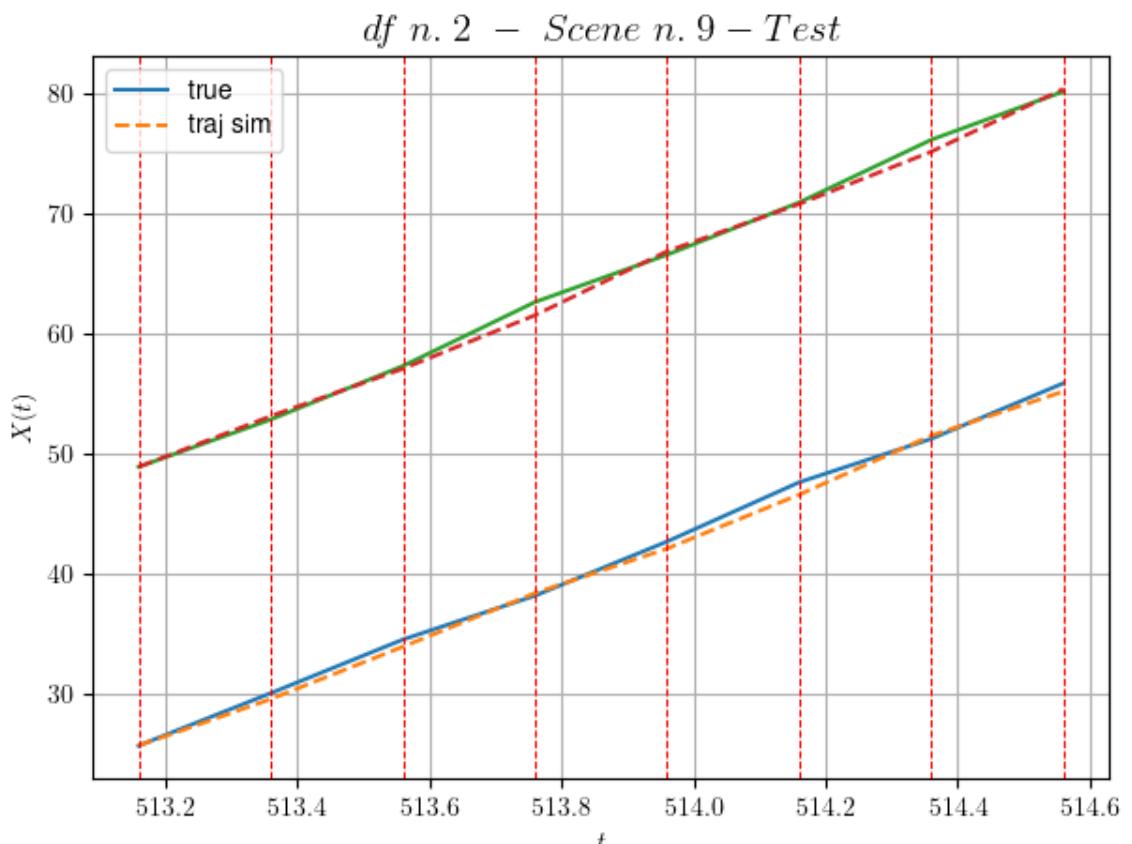
For scene 7/23:
* MSE = 1.0689007383944875

DataFrame n.2. Scene n.8/23



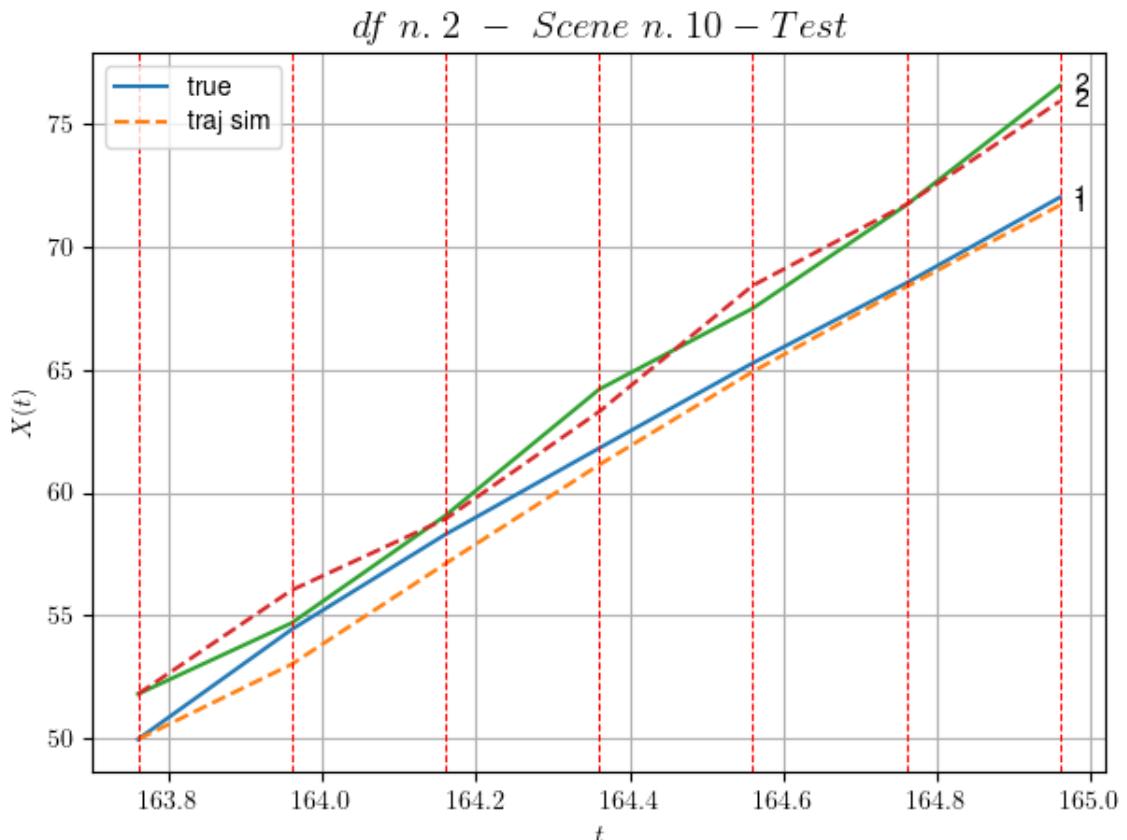
For scene 8/23:
* MSE = 0.7867613048511766

DataFrame n.2. Scene n.9/23



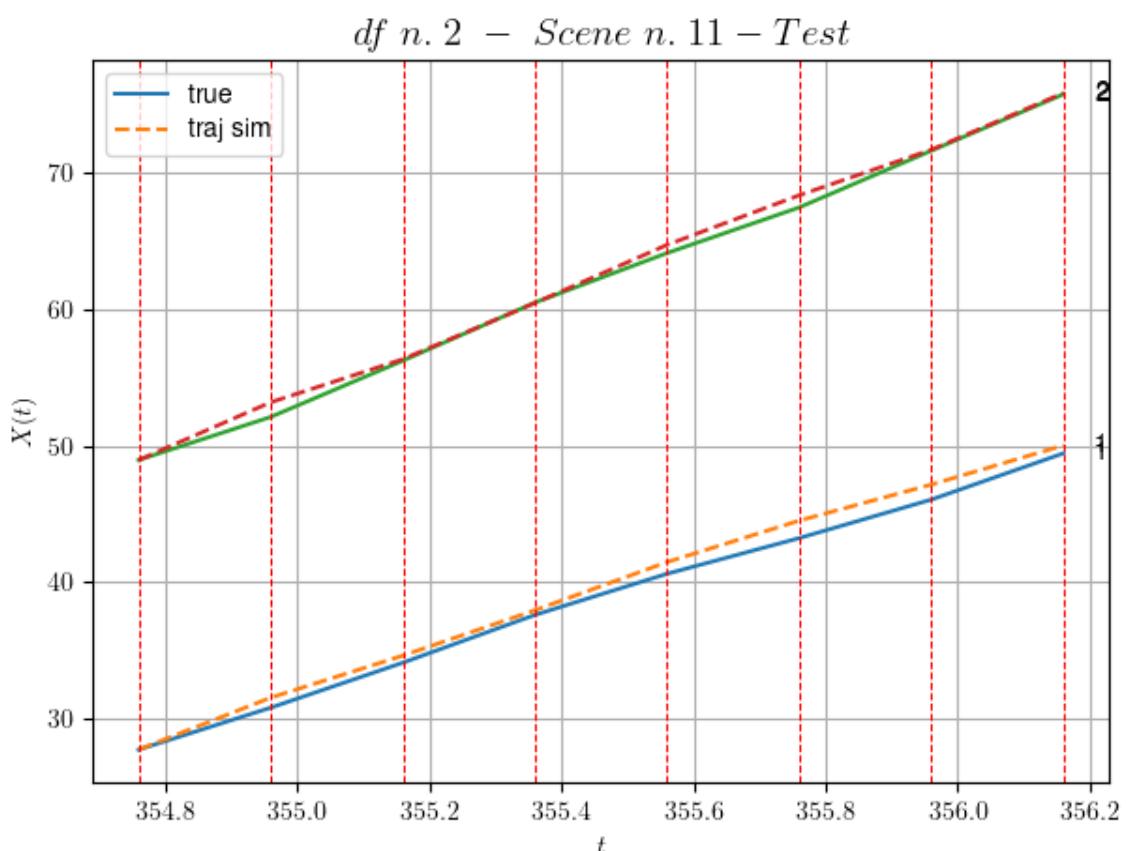
For scene 9/23:
* MSE = 0.31478545644226374

DataFrame n.2. Scene n.10/23



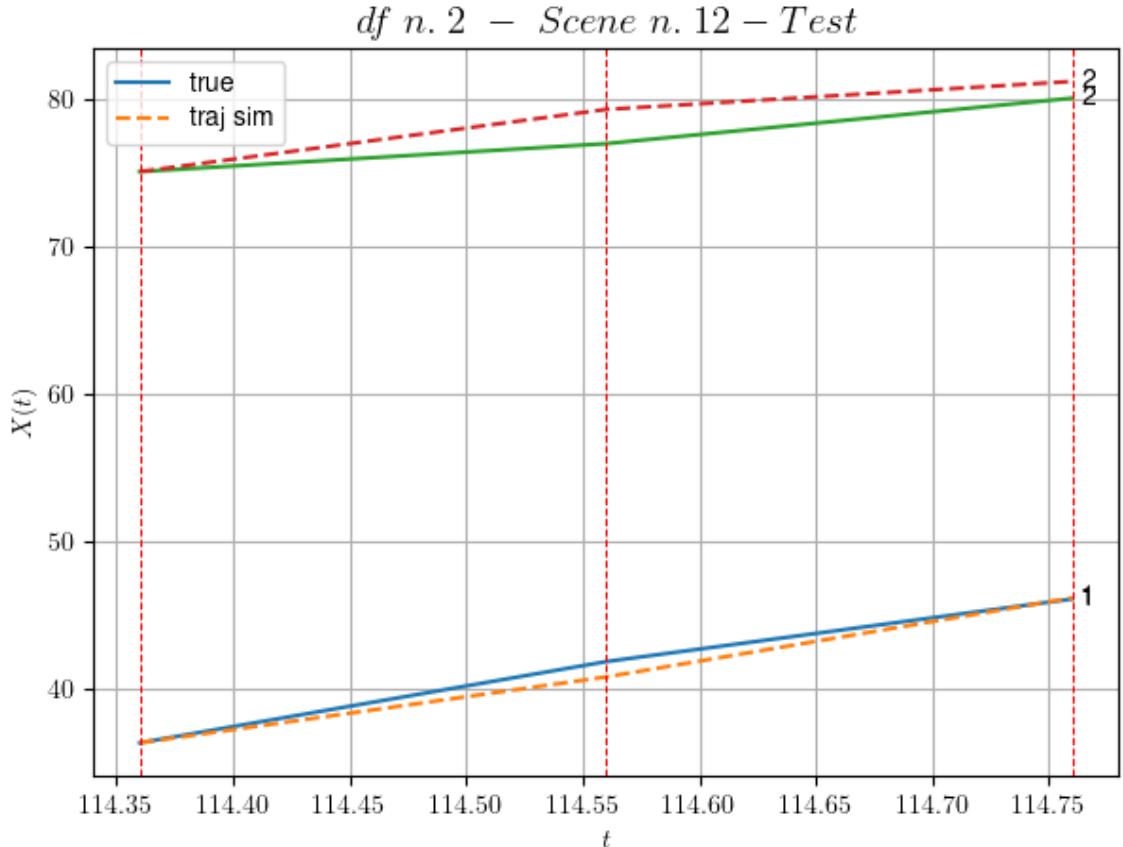
For scene 10/23:
* MSE = 0.5731149828599108

DataFrame n.2. Scene n.11/23



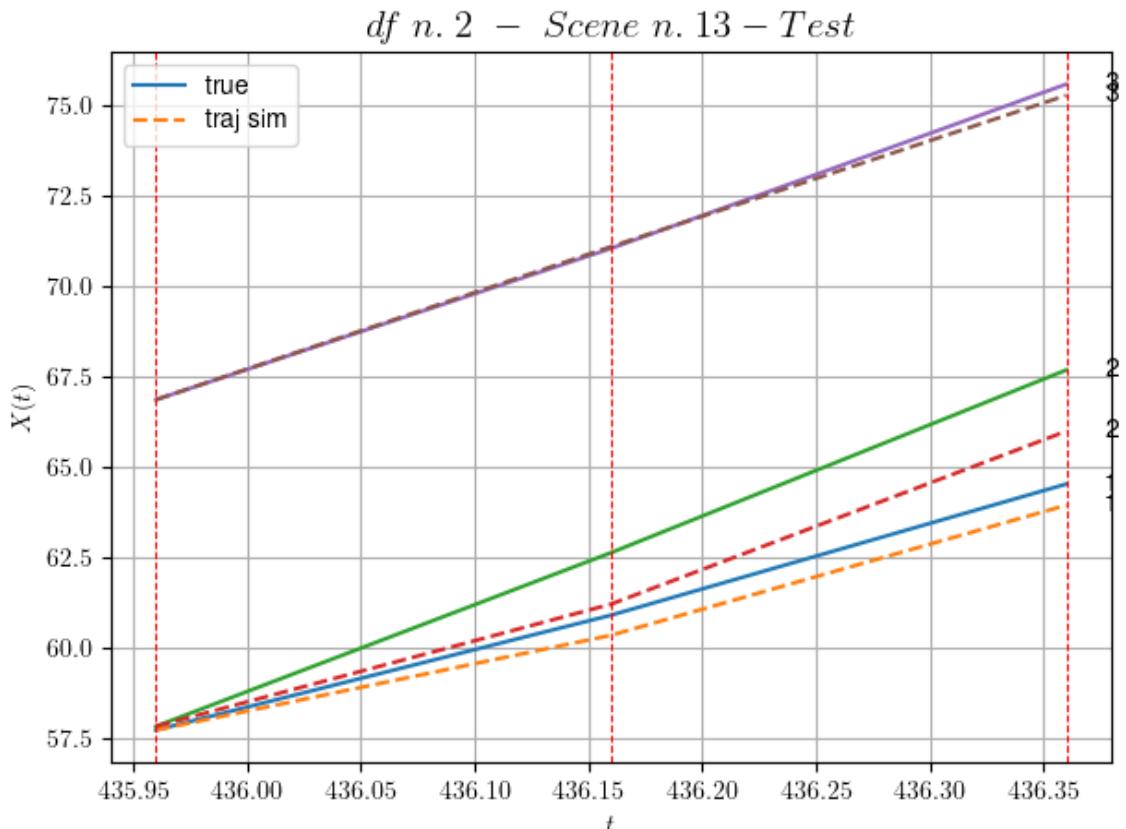
For scene 11/23:
* MSE = 0.44688093263076567

DataFrame n.2. Scene n.12/23



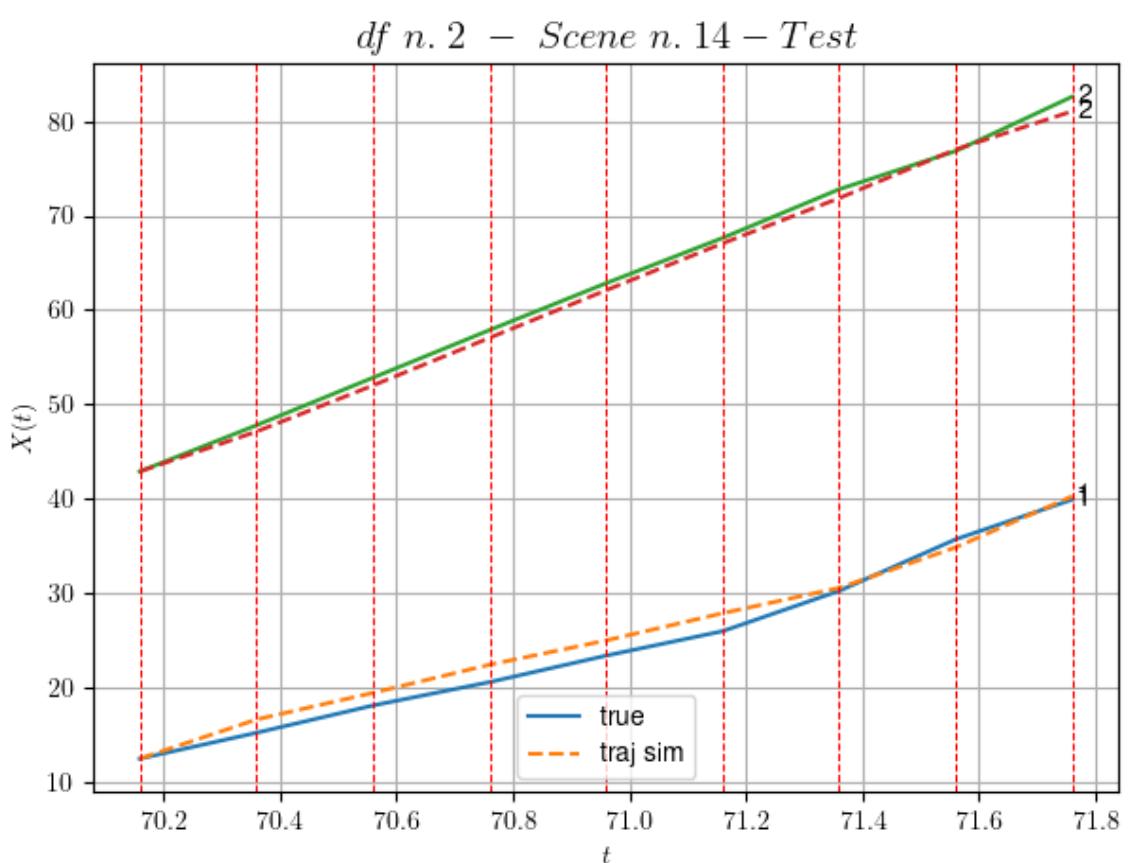
For scene 12/23:
* MSE = 1.2953804743074055

DataFrame n.2. Scene n.13/23



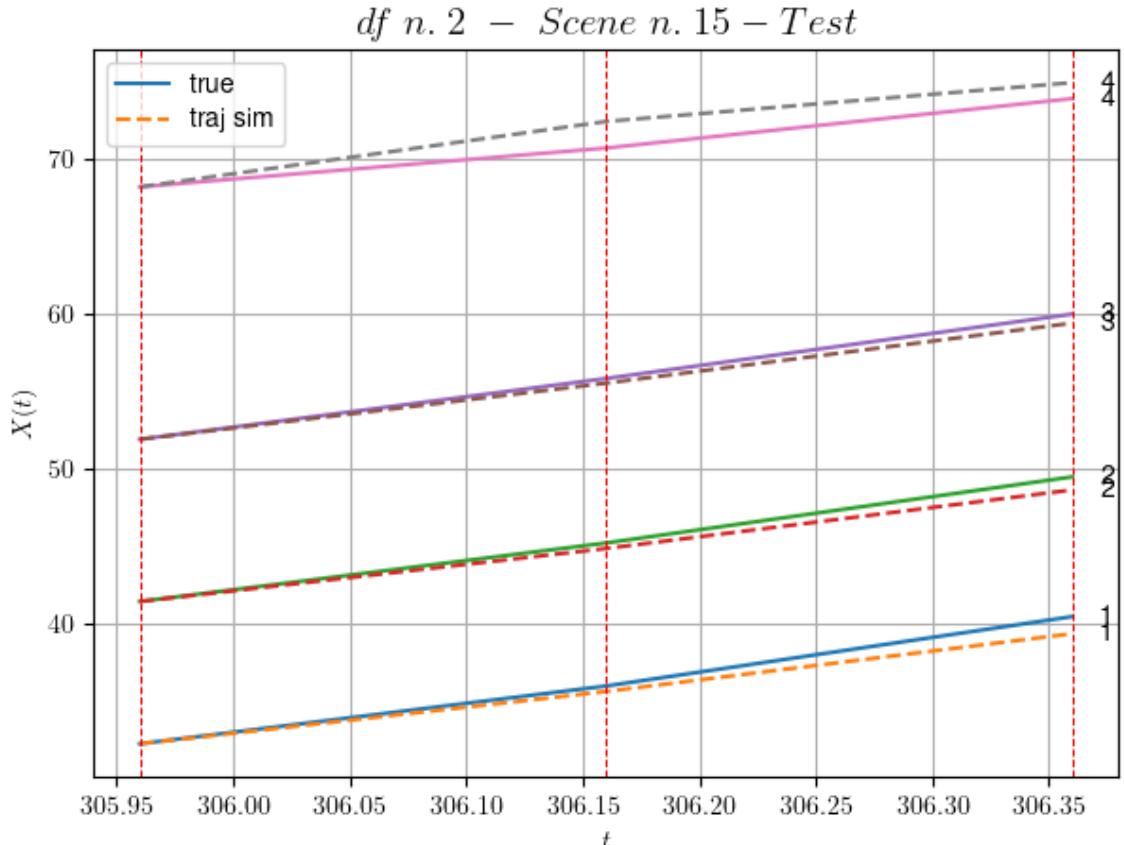
For scene 13/23:
* MSE = 0.6229323156824362

DataFrame n.2. Scene n.14/23



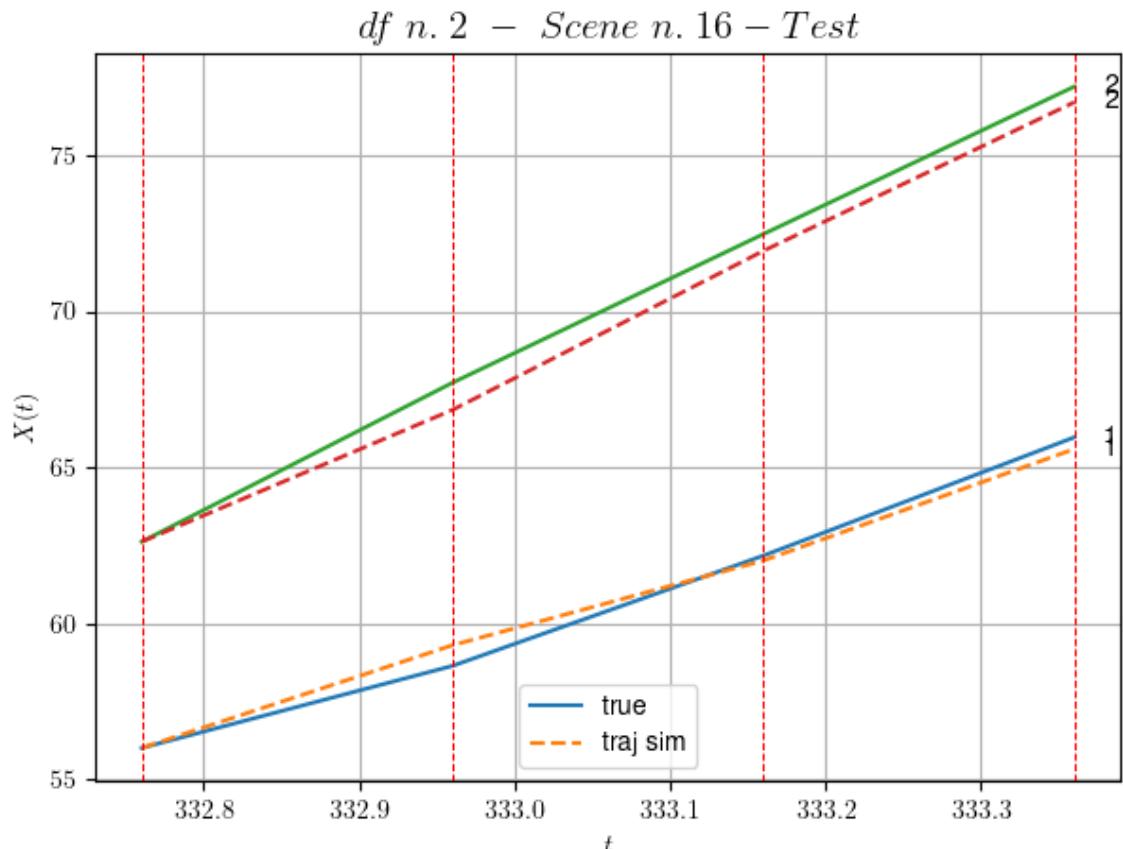
For scene 14/23:
* MSE = 1.129181425077837

DataFrame n.2. Scene n.15/23



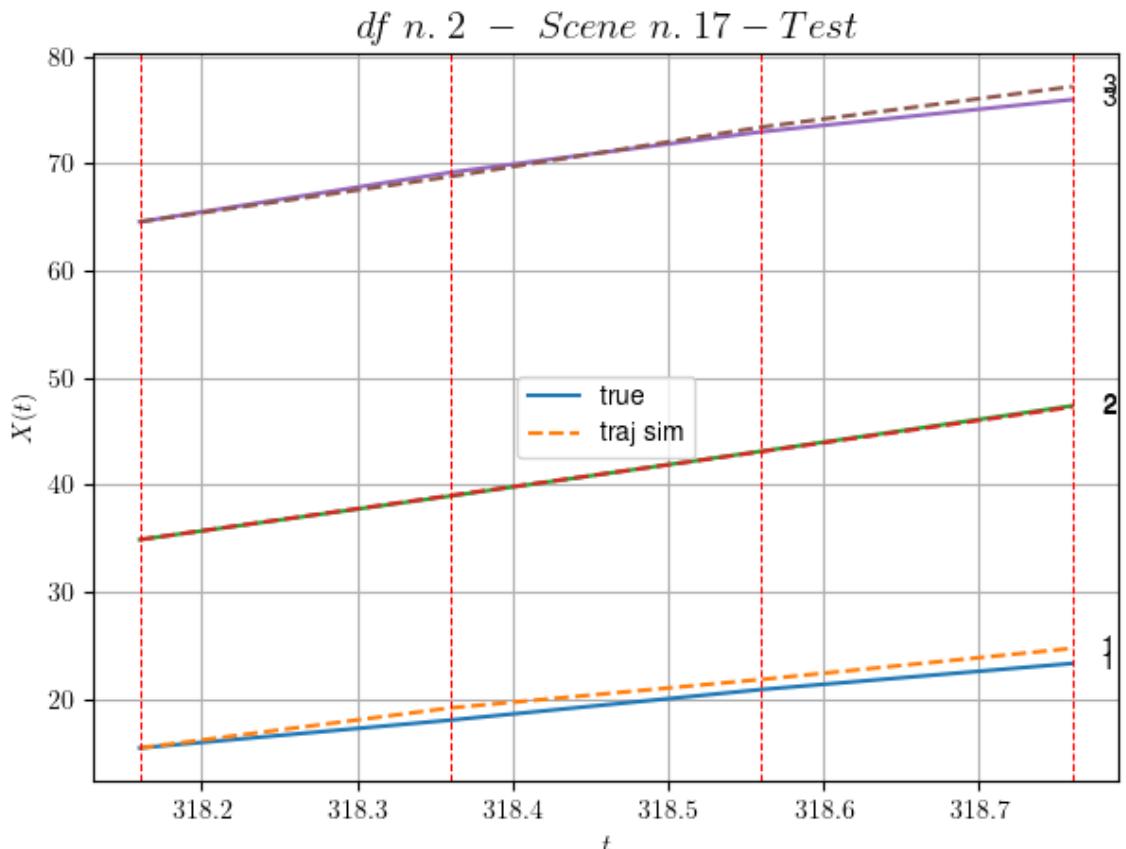
For scene 15/23:
* MSE = 0.5512259362278609

DataFrame n.2. Scene n.16/23



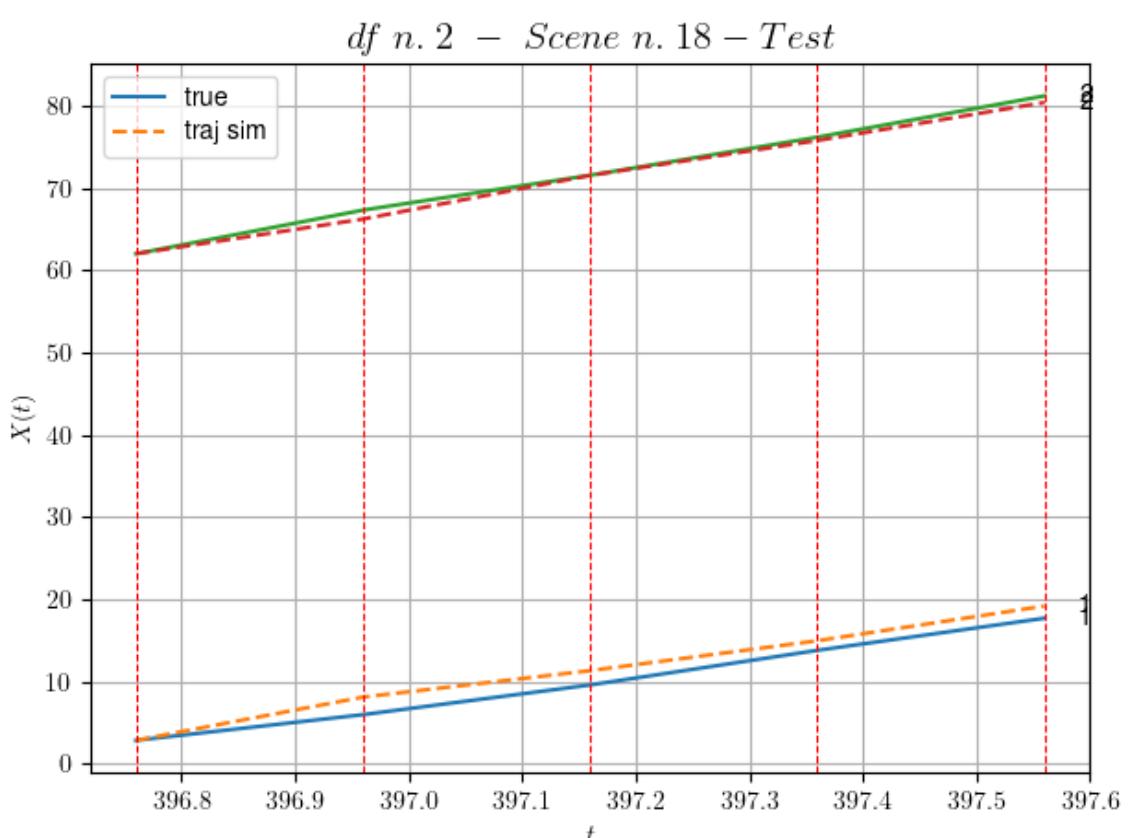
For scene 16/23:
* MSE = 0.2376633670659182

DataFrame n.2. Scene n.17/23



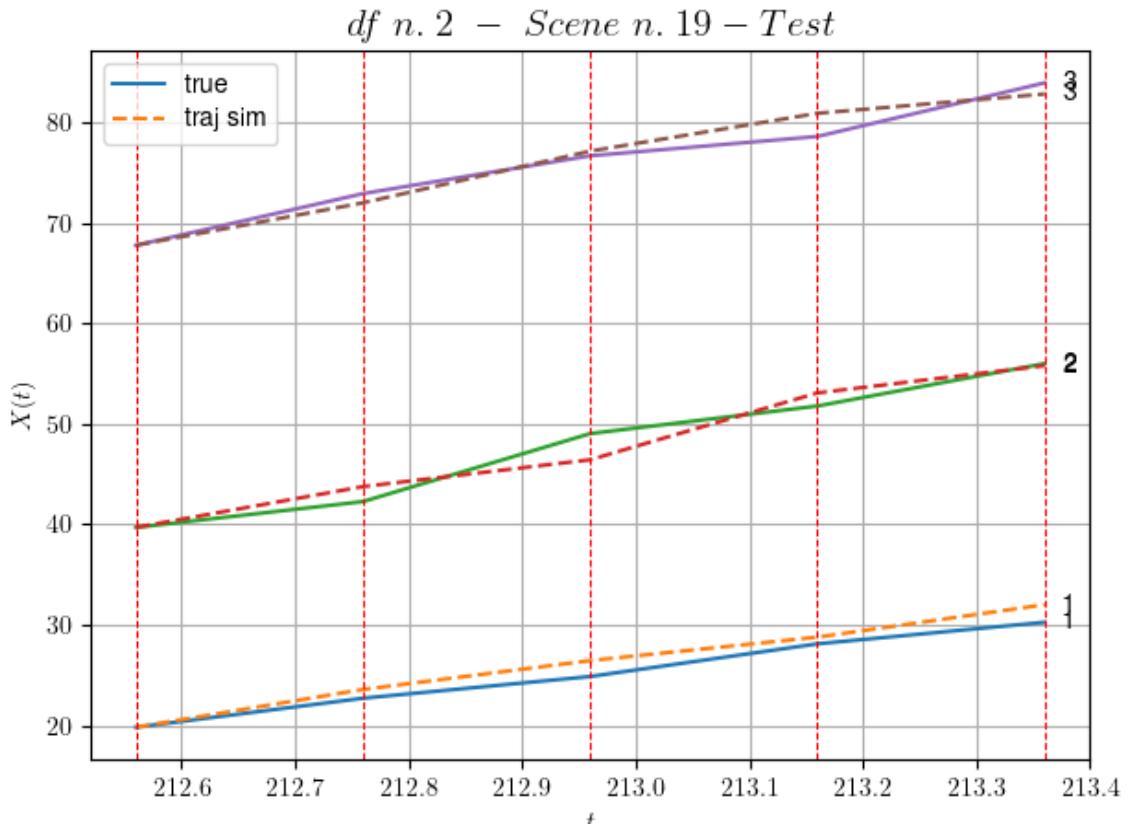
For scene 17/23:
* MSE = 0.5001707301399779

DataFrame n.2. Scene n.18/23



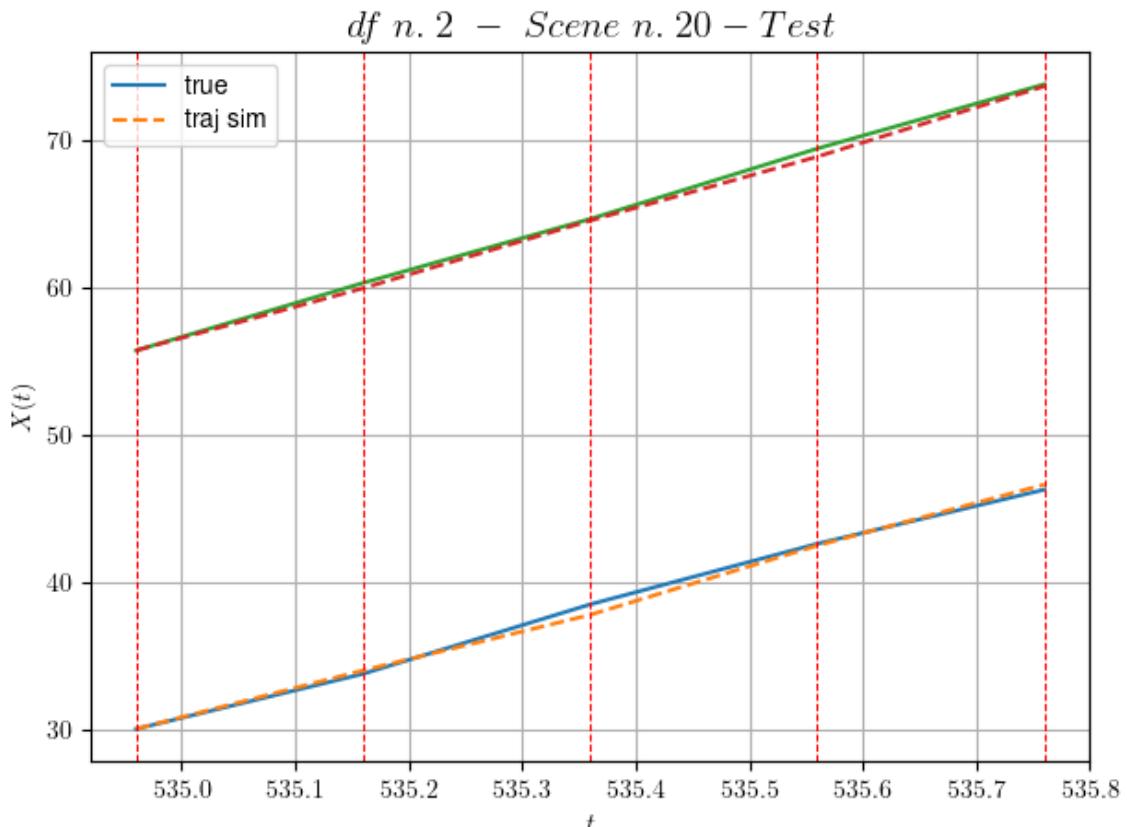
For scene 18/23:
* MSE = 1.3126721169971483

DataFrame n.2. Scene n.19/23



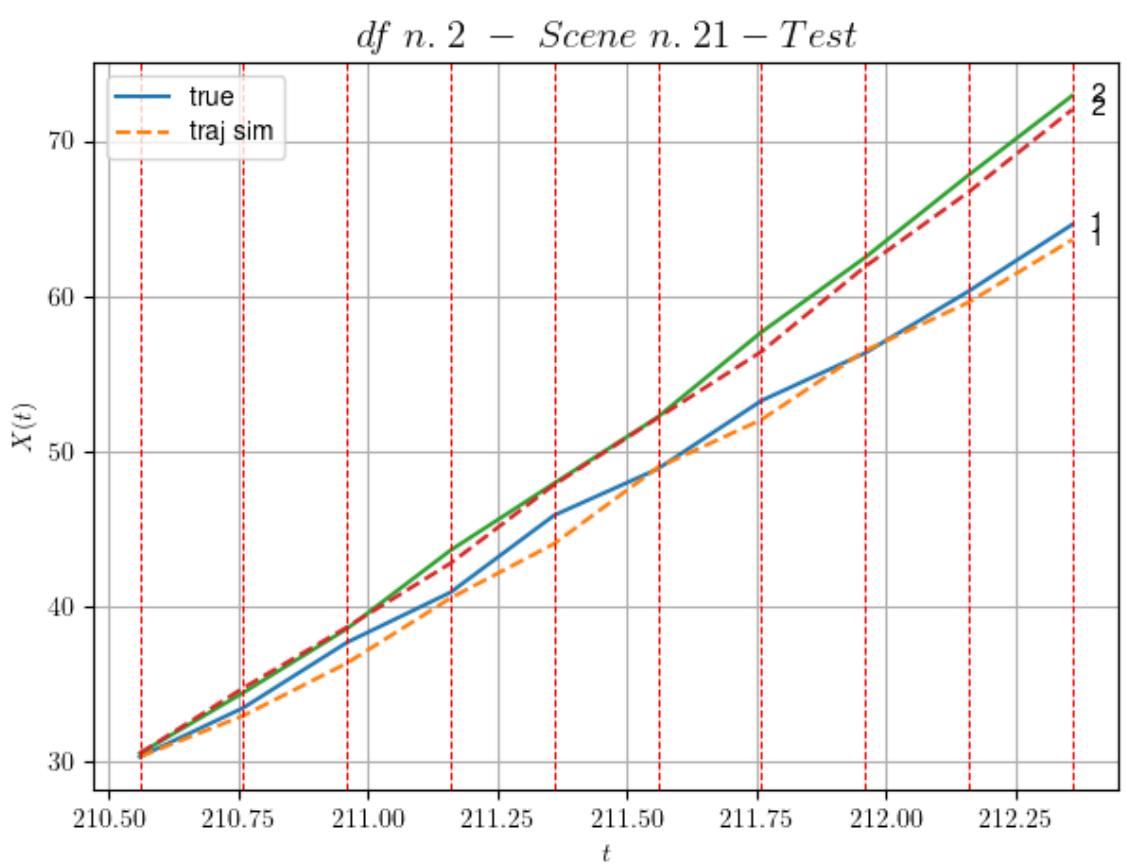
For scene 19/23:
* MSE = 1.6724798071523699

DataFrame n.2. Scene n.20/23



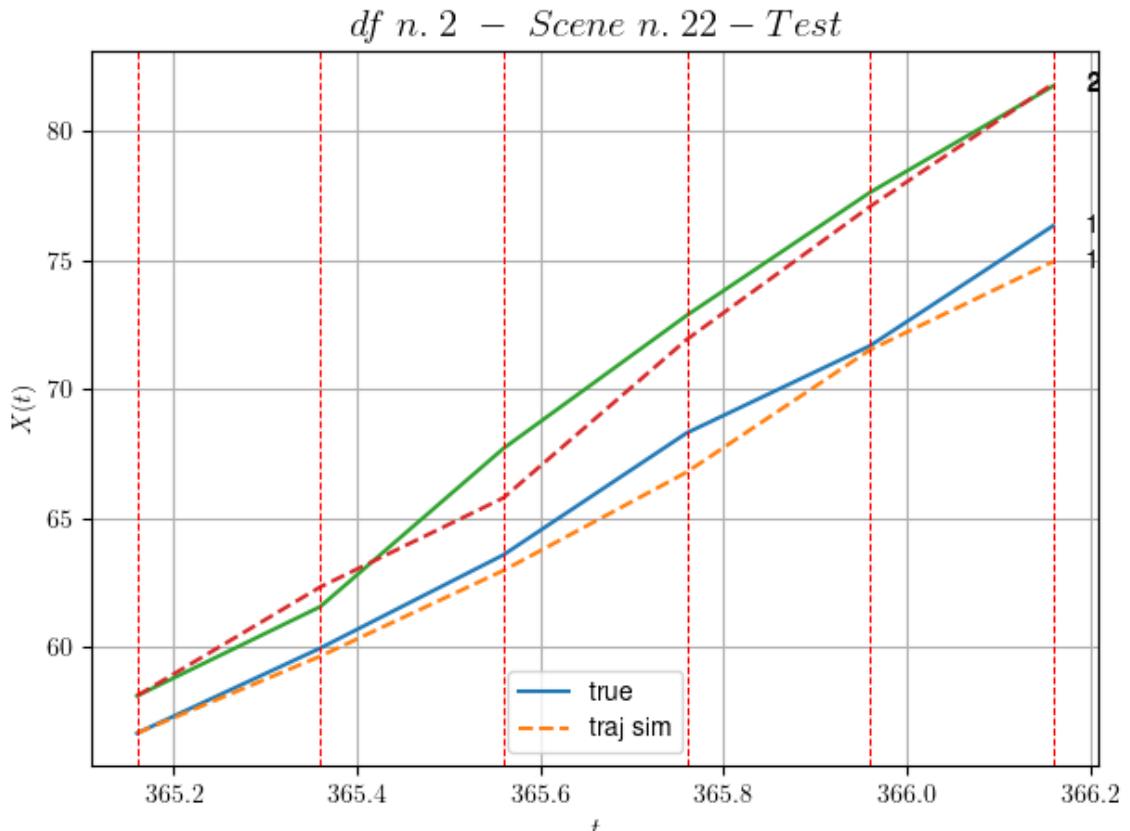
For scene 20/23:
* MSE = 0.11462815688900603

DataFrame n.2. Scene n.21/23



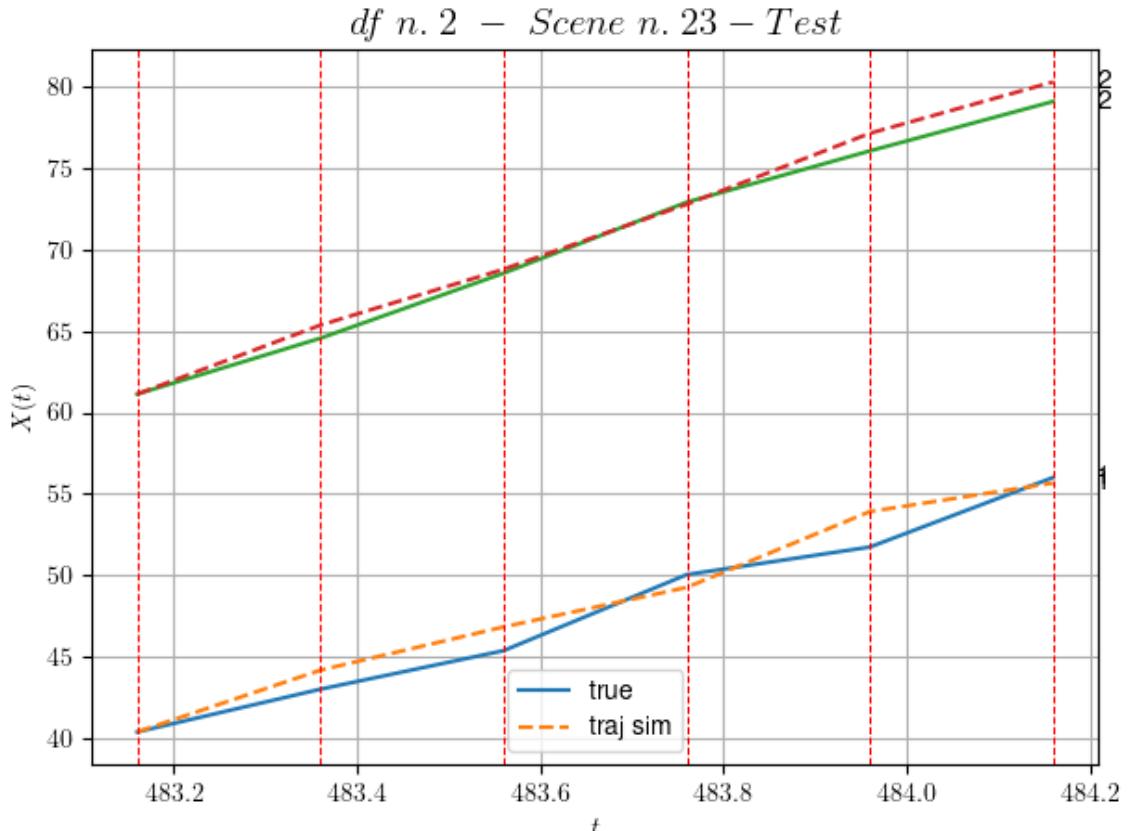
For scene 21/23:
* MSE = 0.6638850510286223

DataFrame n.2. Scene n.22/23



For scene 22/23:
* MSE = 0.8486705033706181

DataFrame n.2. Scene n.23/23



For scene 23/23:
* MSE = 1.020366580595356

MSE test: 1.119179357984876

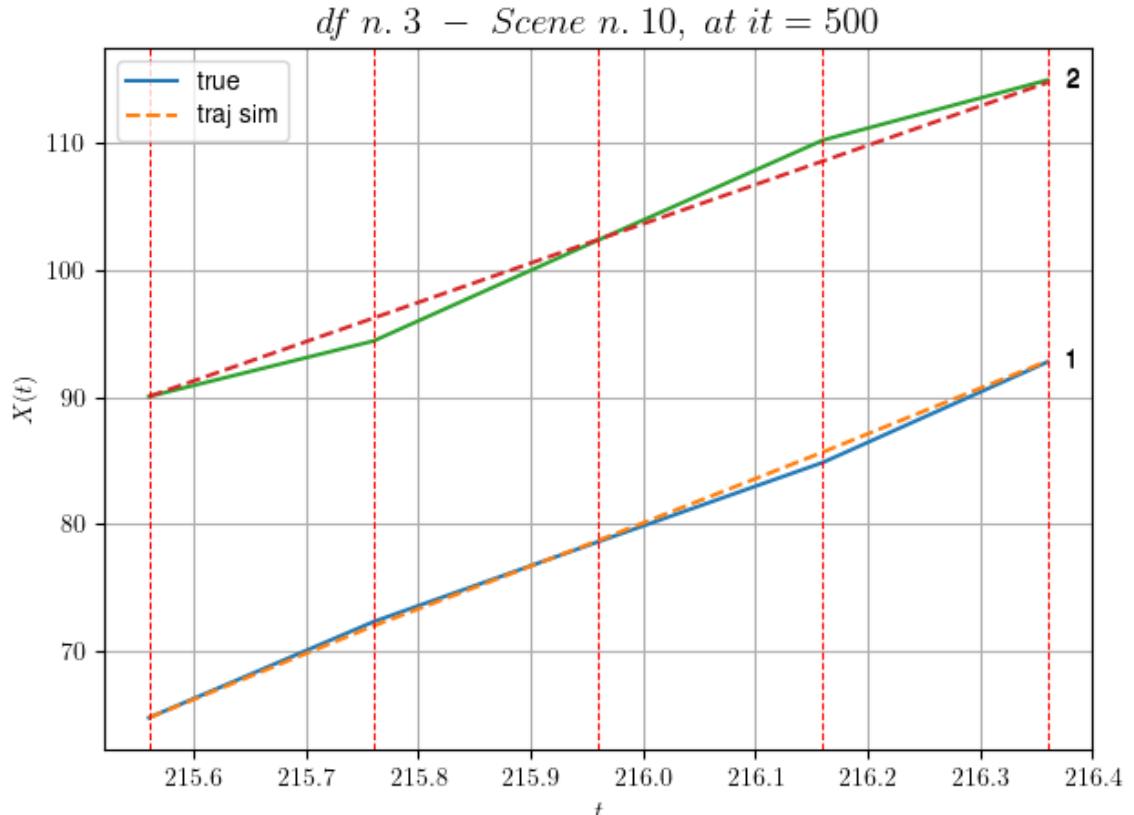
Summing up:
* MSE train: 3.349489239487959
* MSE test: 1.119179357984876

Analyzing 3/10 dfs.
In DataFrame n.3 we have 90 scenes.
To train the model we use 60 scenes, the remaining 30 to test the model.

Training step. (60 scenes)

DataFrame n.3. Scene n.1/60

We have 4 time intervals inside [215.56, 216.36]

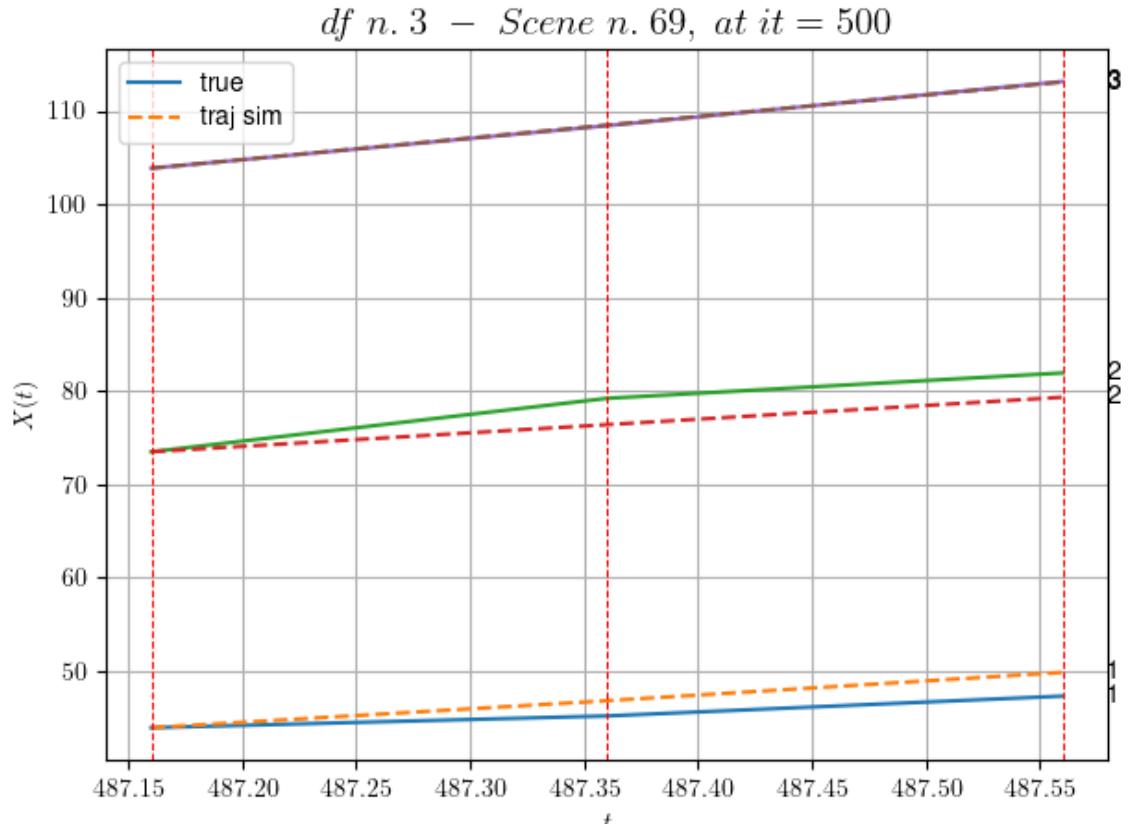


For scene 1/60:

- * After LR finder: LR_NN=5e-05 with mse=0.864121631448909 at it=24
- * v0 = 30.842897264969743
- * MSE = 0.6782902314559
- * iterations = 500

DataFrame n.3. Scene n.2/60

We have 2 time intervals inside [487.16, 487.56]

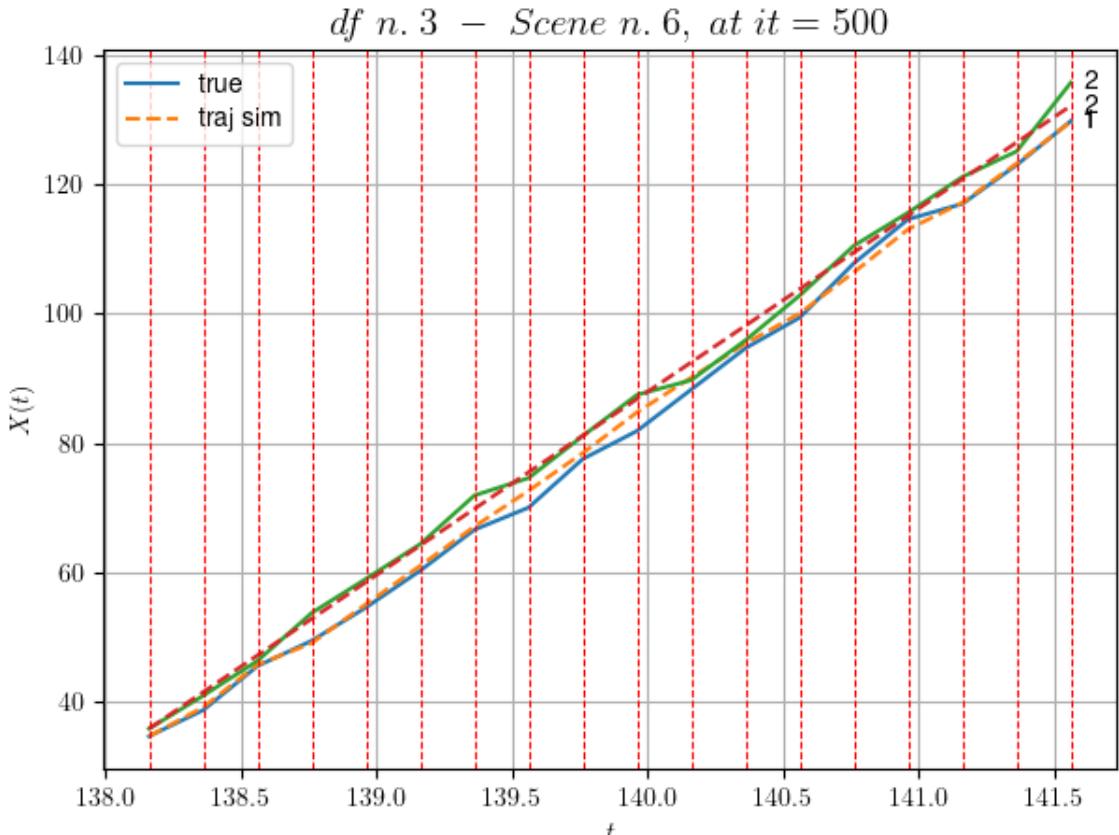


For scene 2/60:

* After LR finder: $LR_NN=5e-05$ with $mse=3.8790904483875353$
at it=24
* $v_0 = 23.071831621686442$
* $MSE = 2.6461141090086415$
* iterations = 500

DataFrame n.3. Scene n.3/60

We have 17 time intervals inside [138.16, 141.56]

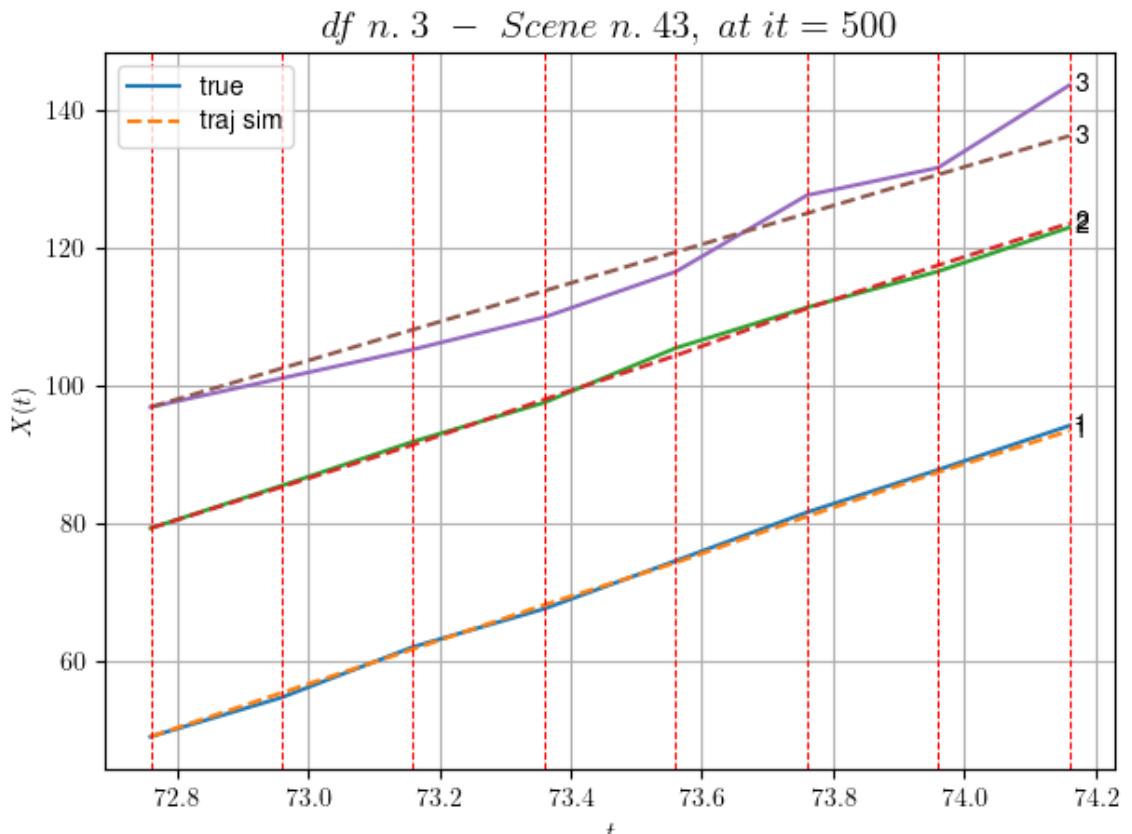


For scene 3/60:

- * After LR finder: LR_NN=0.001 with mse=8.912010933828252 at it=24
- * v0 = 28.318639127967636
- * MSE = 1.7687666302195506
- * iterations = 500

DataFrame n.3. Scene n.4/60

We have 7 time intervals inside [72.76,74.16]

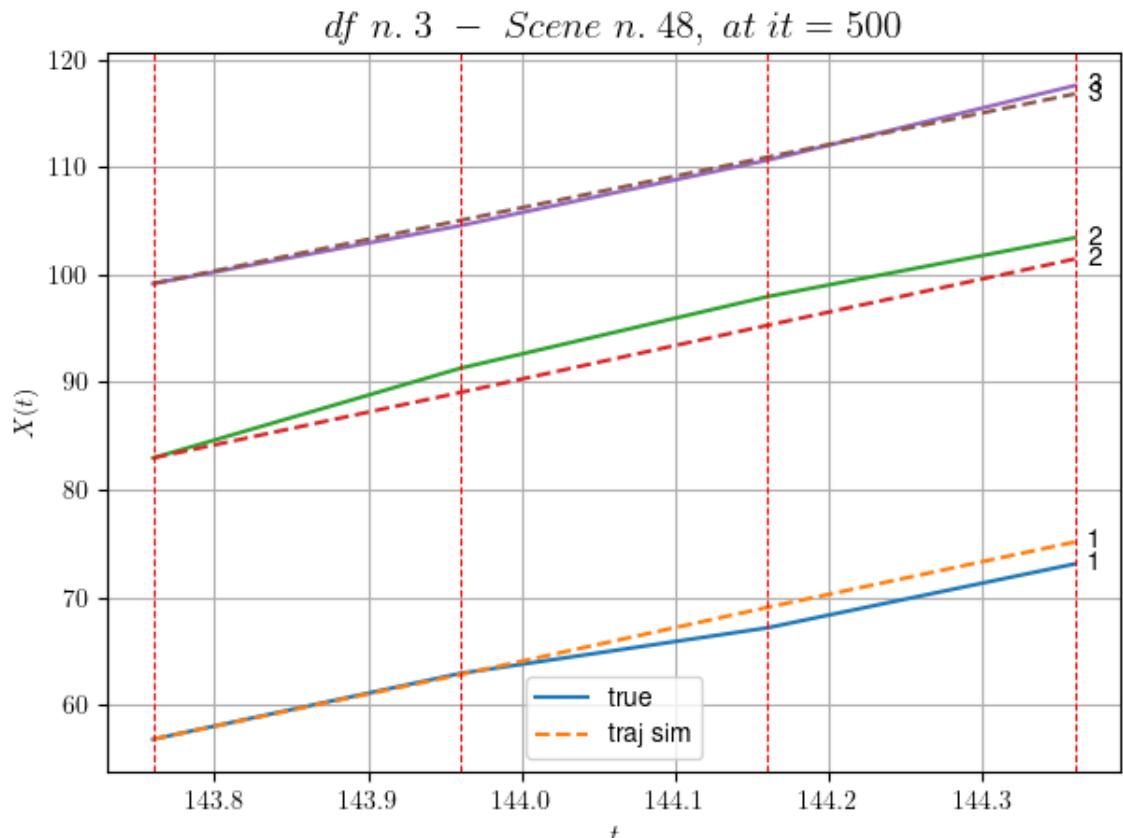


For scene 4/60:

* After LR finder: LR_NN=0.0005 with mse=47.60353577316244
at it=24
* v0 = 28.121240263140198
* MSE = 4.163229112484414
* iterations = 500

DataFrame n.3. Scene n.5/60

We have 3 time intervals inside [143.76,144.36]

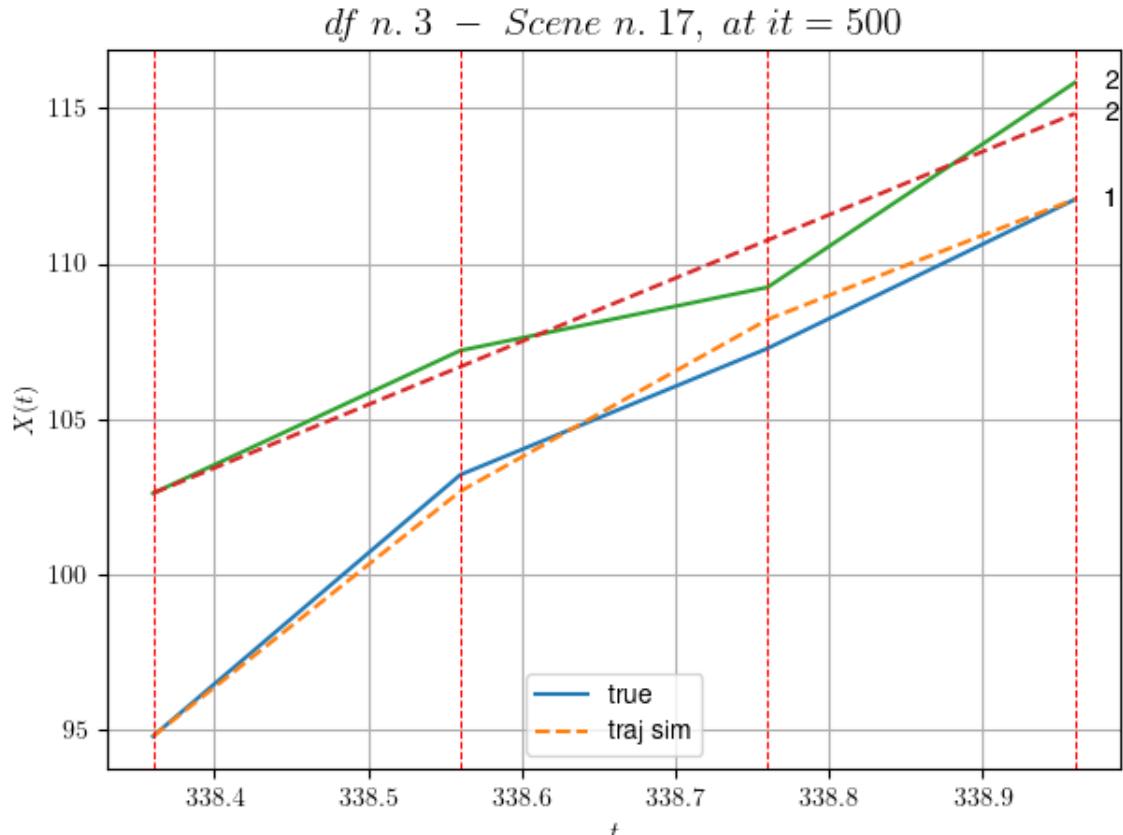


For scene 5/60:

- * After LR finder: $LR_NN=5e-05$ with $mse=17.74657047238821$ at $it=24$
- * $v_0 = 29.414744463247$
- * MSE = 1.2928437812932525
- * iterations = 500

DataFrame n.3. Scene n.6/60

We have 3 time intervals inside [338.36, 338.96]



For scene 6/60:

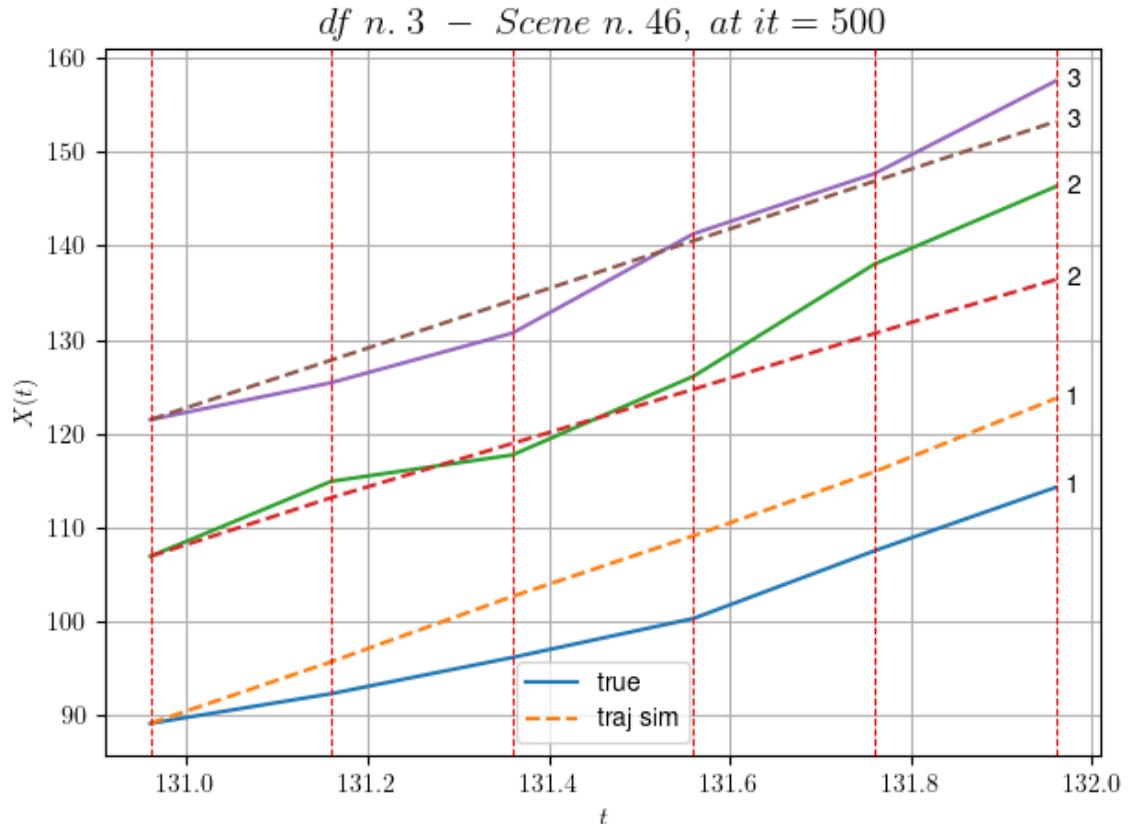
- * After LR finder: LR_NN=0.0005 with mse=7.075217836670375

at it=24

- * v0 = 20.358070226672677
- * MSE = 0.588758460483602
- * iterations = 500

DataFrame n.3. Scene n.7/60

We have 5 time intervals inside [130.96, 131.96]

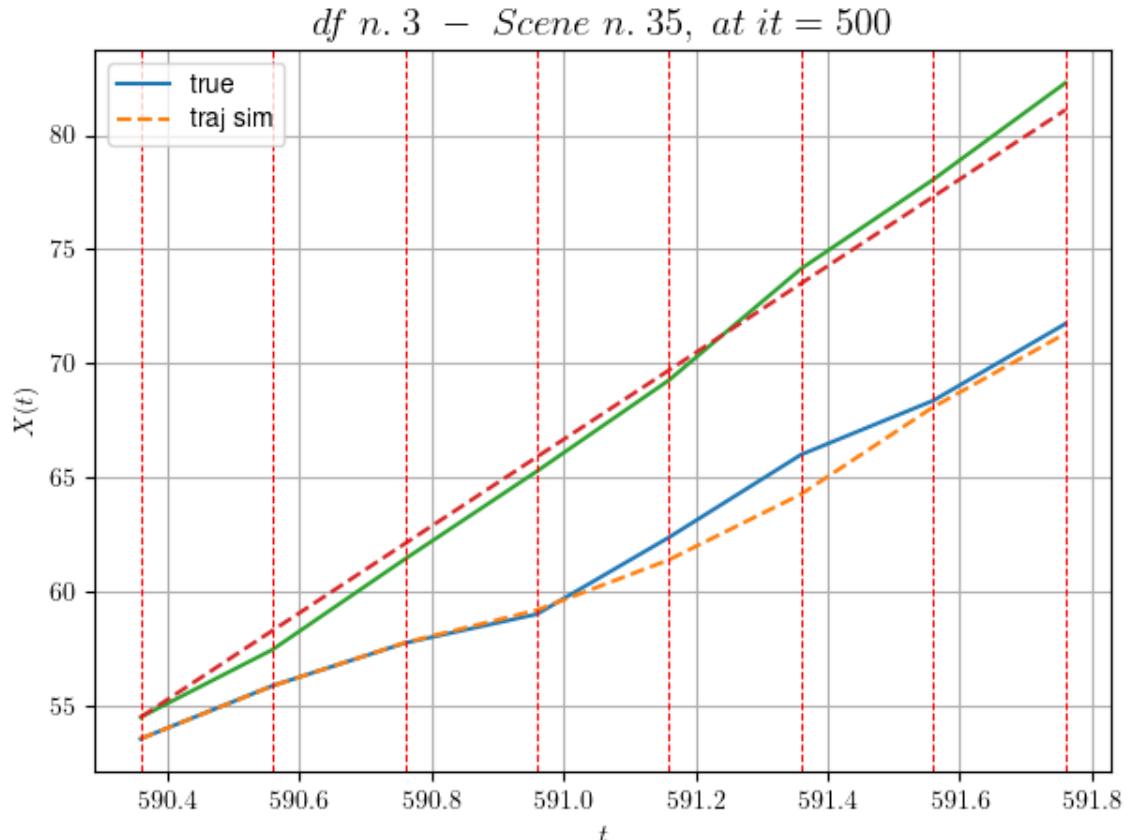


For scene 7/60:

* After LR finder: LR_NN=0.0001 with mse=60.206052563028265
at it=24
* v0 = 31.752337885123886
* MSE = 27.16048802908381
* iterations = 500

DataFrame n.3. Scene n.8/60

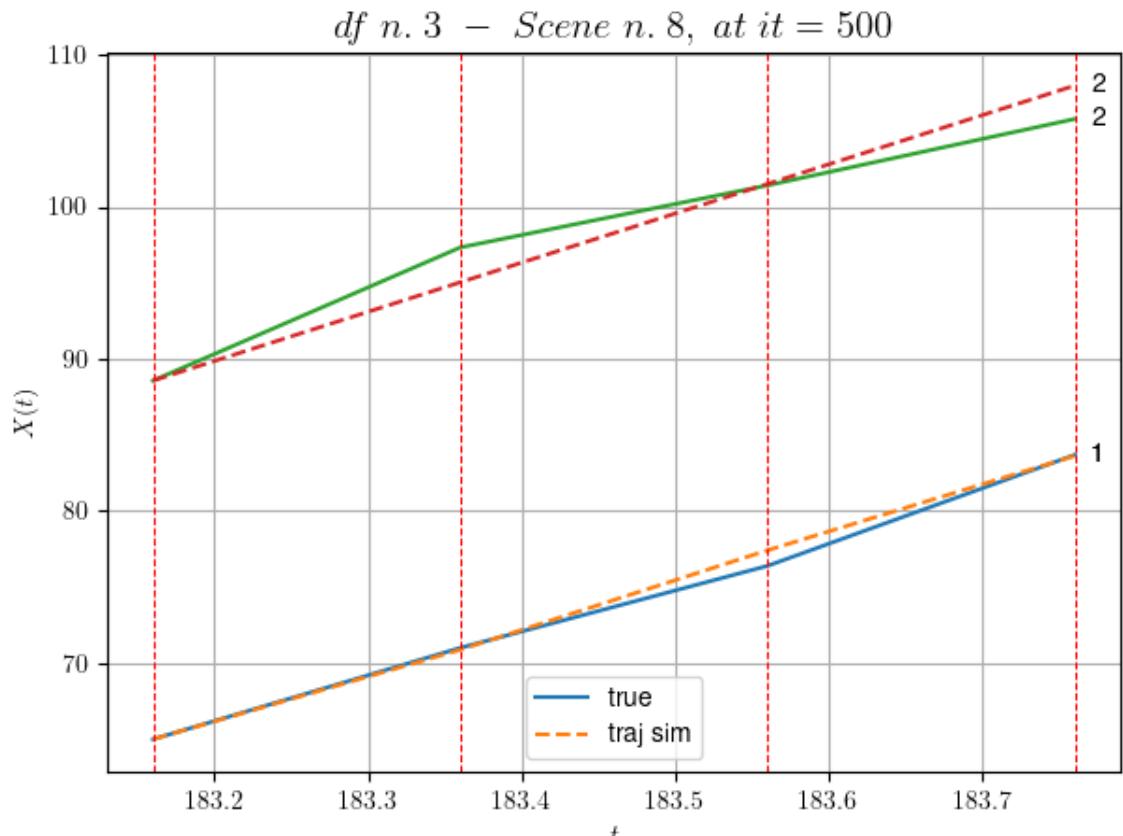
We have 7 time intervals inside [590.36, 591.76]



For scene 8/60:
* After LR finder: LR_NN=0.005 with mse=39.98231835698768 at
t it=24
* v0 = 19.03547663942669
* MSE = 0.3742351279583066
* iterations = 500

DataFrame n.3. Scene n.9/60

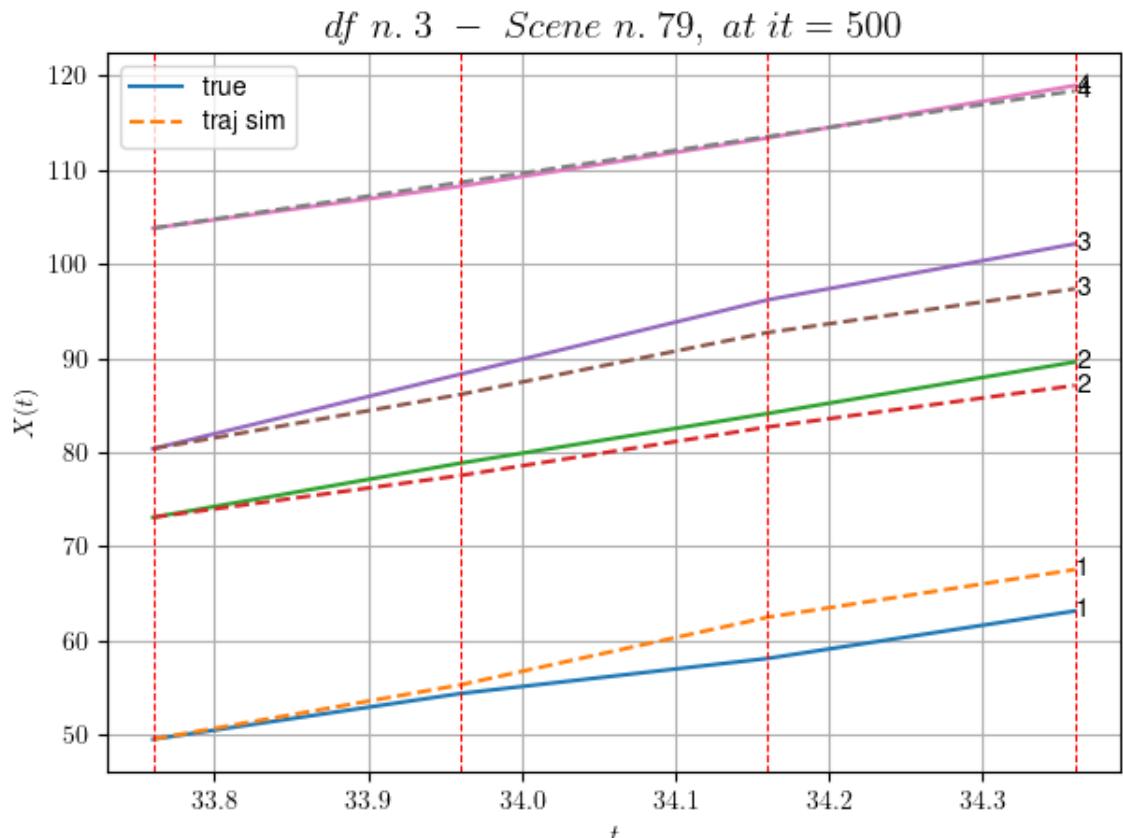
We have 3 time intervals inside [183.16,183.76]



For scene 9/60:
* After LR finder: LR_NN=1e-05 with mse=1.2410757387922187
at it=24
* v0 = 32.313983310468906
* MSE = 1.345923764741262
* iterations = 500

DataFrame n.3. Scene n.10/60

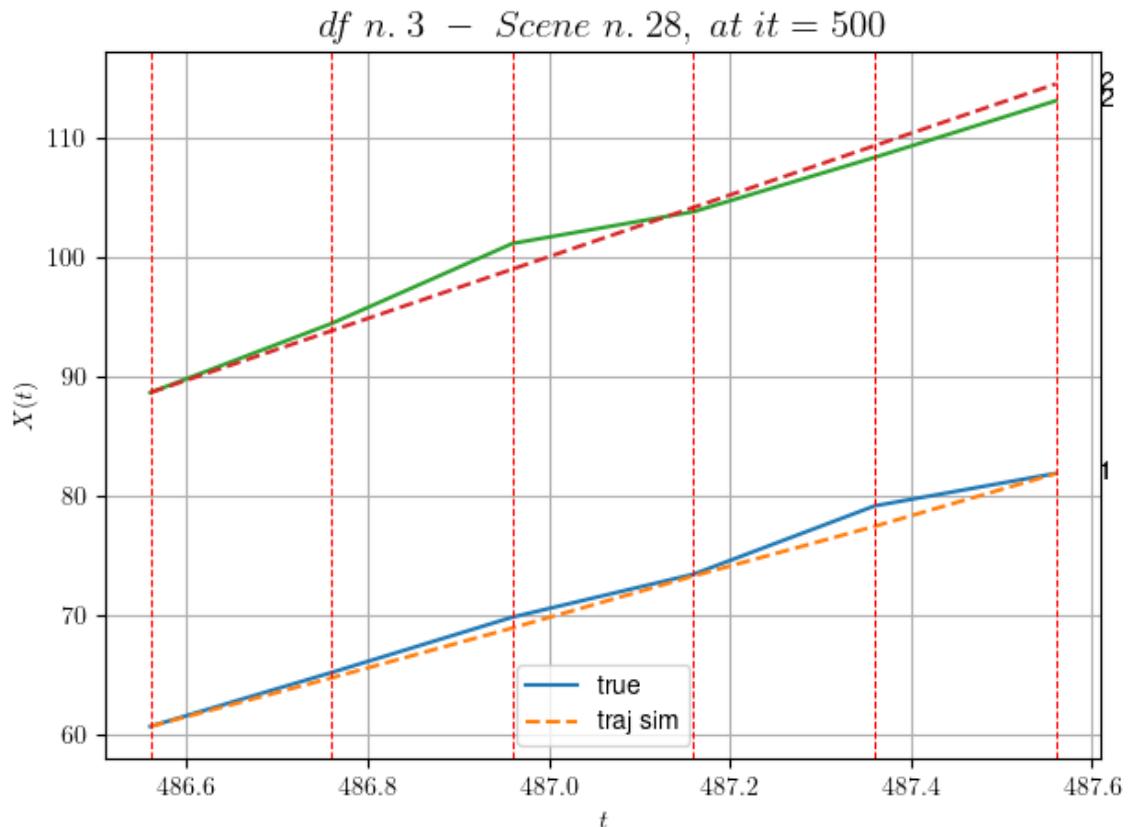
We have 3 time intervals inside [33.76,34.36]



For scene 10/60:
* After LR finder: LR_NN=0.0005 with mse=16.067959262185255
at it=24
* v0 = 24.315647482967336
* MSE = 5.296231520677807
* iterations = 500

DataFrame n.3. Scene n.11/60

We have 5 time intervals inside [486.56,487.56]

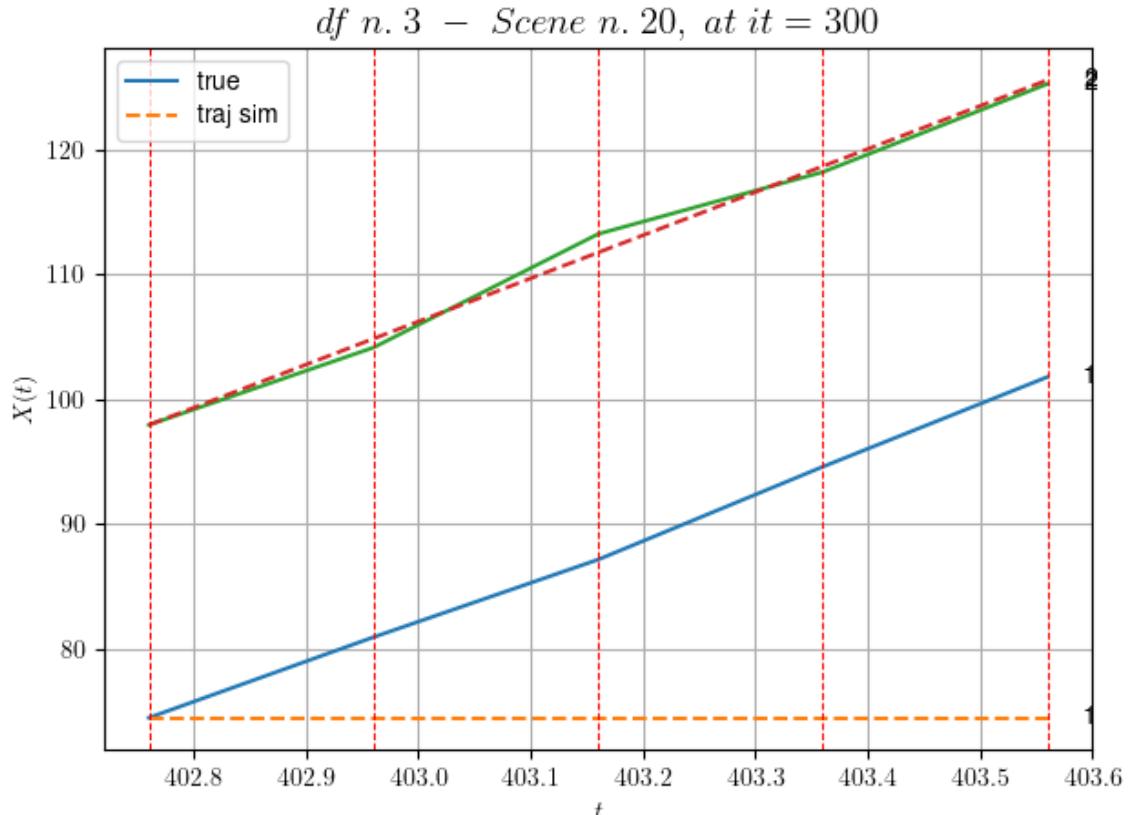


For scene 11/60:

* After LR finder: LR_NN=5e-05 with mse=5.170861013135162 at it=24
* $v_0 = 25.85811943170903$
* MSE = 0.9813312635624803
* iterations = 500

DataFrame n.3. Scene n.12/60

We have 4 time intervals inside [402.76,403.56]

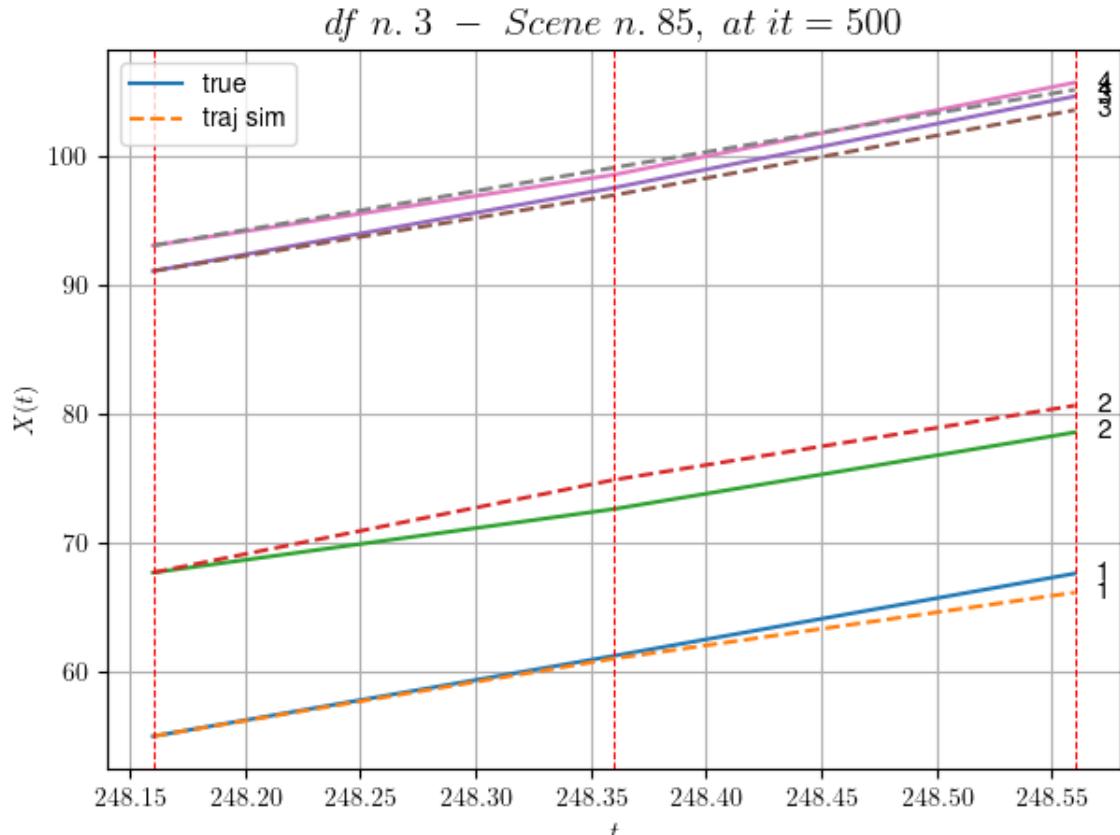


For scene 12/60:

- * After LR finder: LR_NN=0.0005 with mse=2.7792168230678262
- at it=24
- * v0 = 34.51966973499193
- * MSE = 19.19138827993895
- * iterations = 300

DataFrame n.3. Scene n.13/60

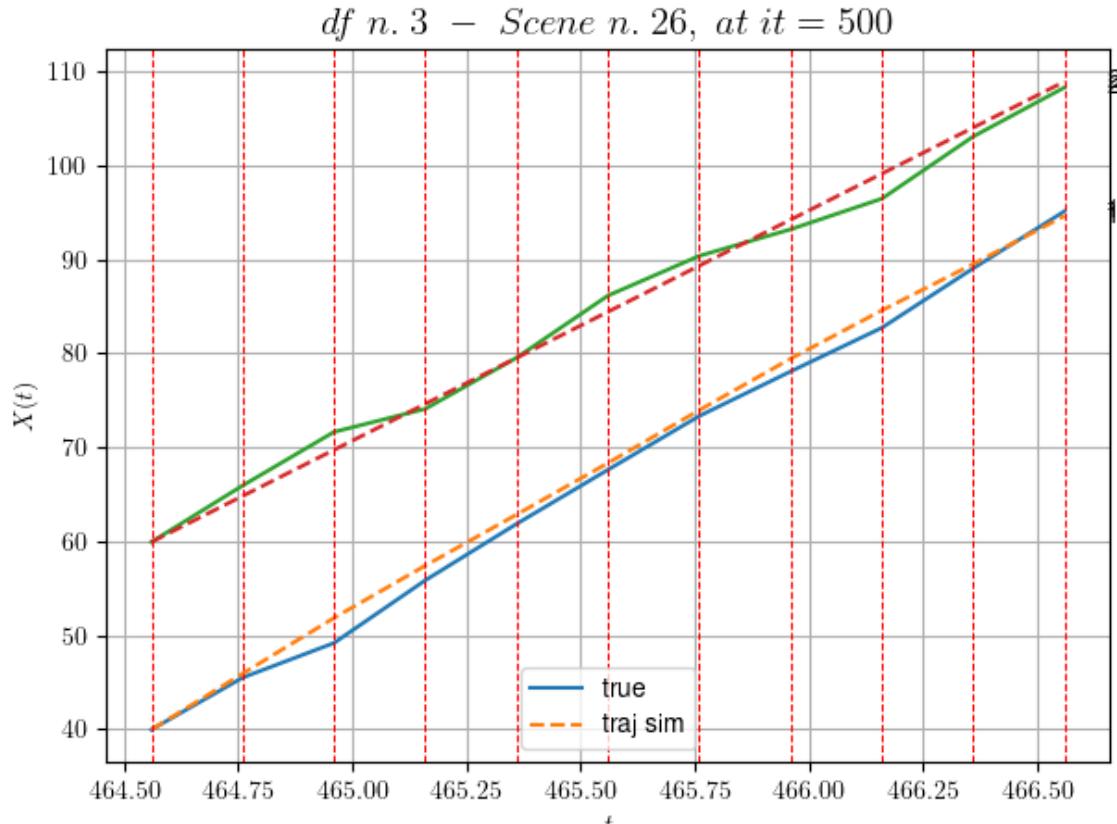
We have 2 time intervals inside [248.16, 248.56]



For scene 13/60:
* After LR finder: LR_NN=0.0005 with mse=17.960106364404545
at it=24
* v0 = 30.24897060982721
* MSE = 1.147108181442823
* iterations = 500

DataFrame n.3. Scene n.14/60

We have 10 time intervals inside [464.56, 466.56]

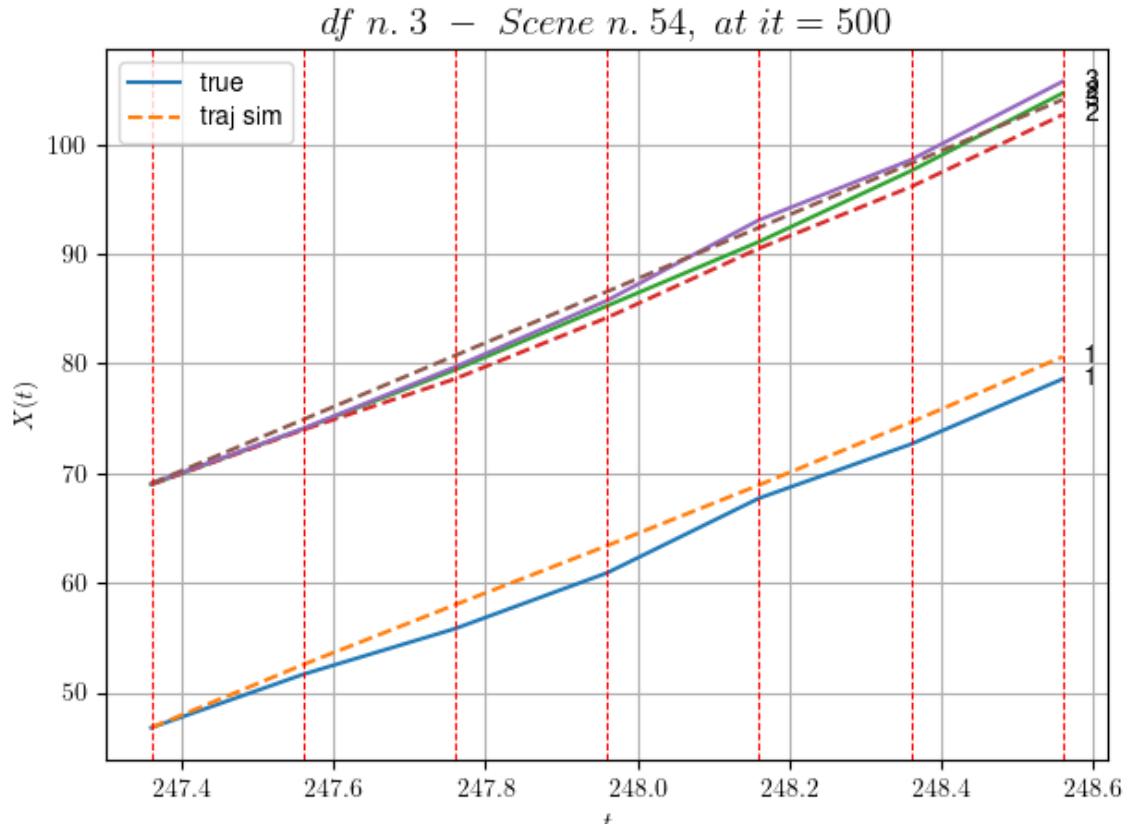


For scene 14/60:

* After LR finder: LR_NN=0.0005 with mse=25.99744602106936
at it=24
* v0 = 24.498602704881197
* MSE = 1.6346363743209136
* iterations = 500

DataFrame n.3. Scene n.15/60

We have 6 time intervals inside [247.36,248.56]

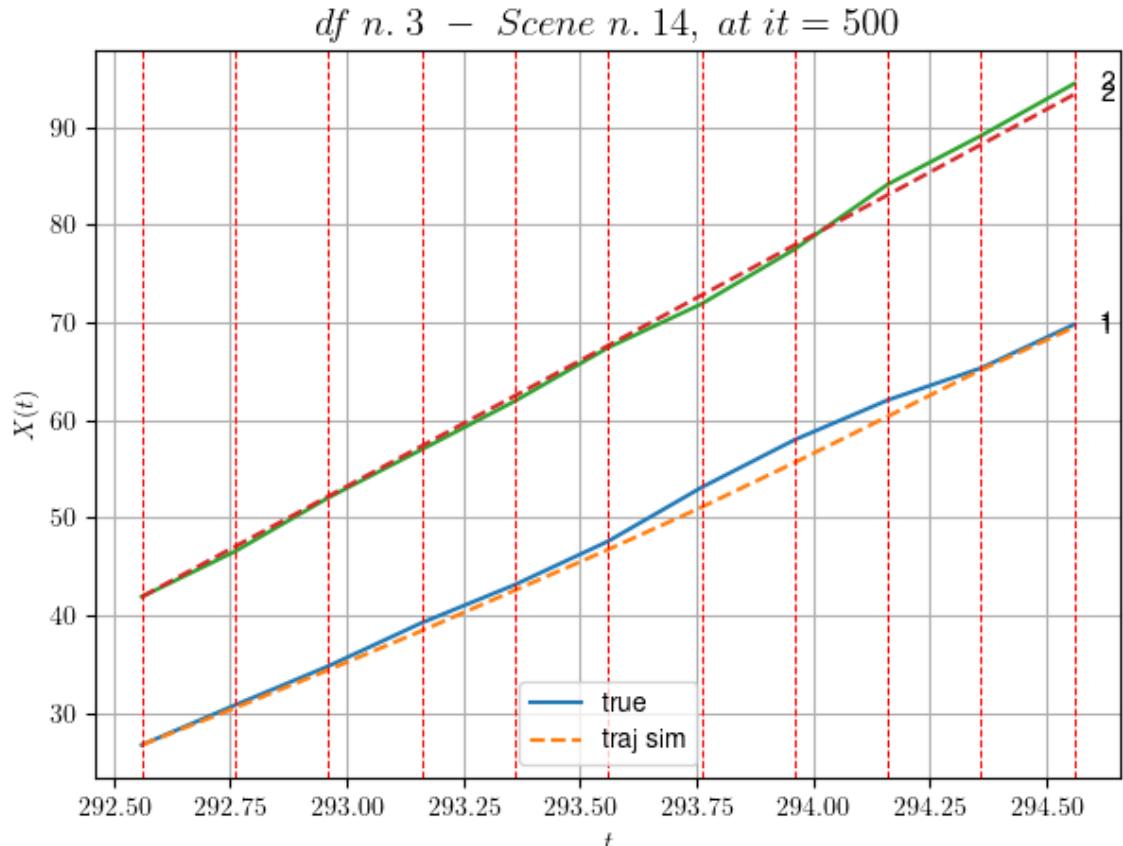


For scene 15/60:

* After LR finder: LR_NN=0.001 with mse=36.98208182861071 at it=24
* v0 = 29.19954509278762
* MSE = 1.4959622042651073
* iterations = 500

DataFrame n.3. Scene n.16/60

We have 10 time intervals inside [292.56, 294.56]

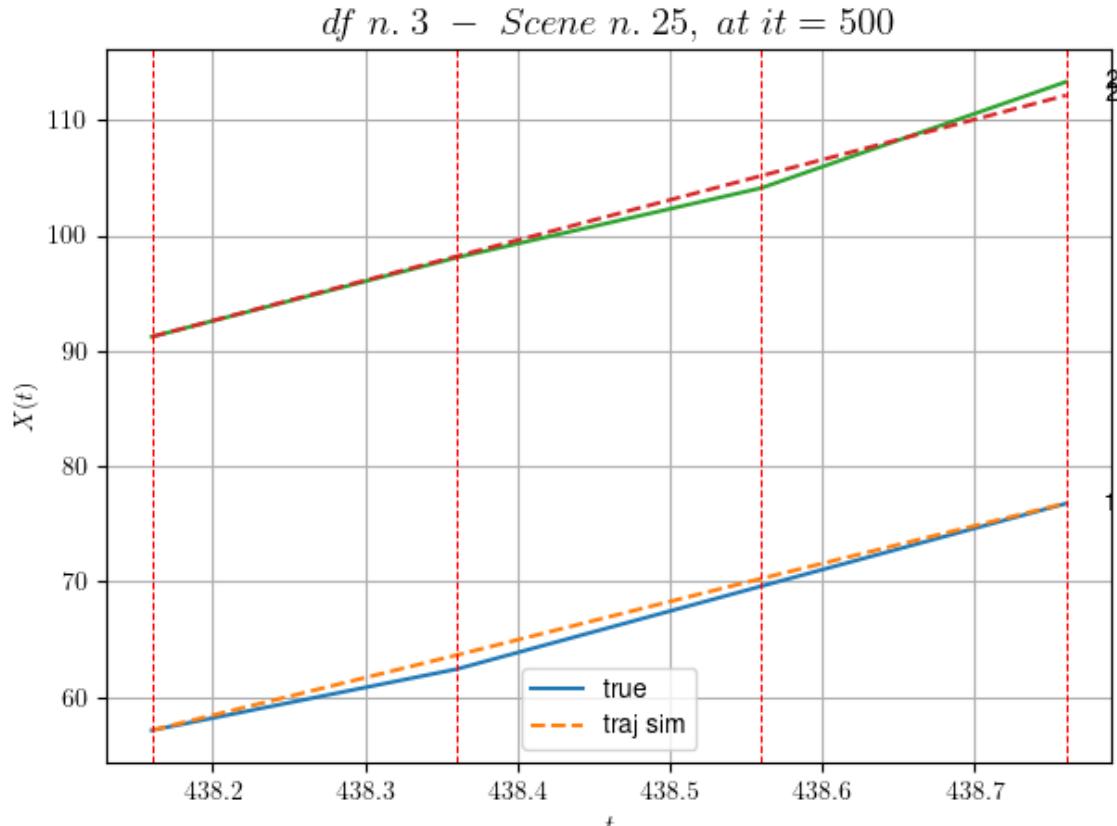


For scene 16/60:

* After LR finder: LR_NN=0.001 with mse=11.980223547521215
at it=24
* $v_0 = 25.74098624838197$
* MSE = 0.3350359965444907
* iterations = 500

DataFrame n.3. Scene n.17/60

We have 3 time intervals inside [438.16,438.76]

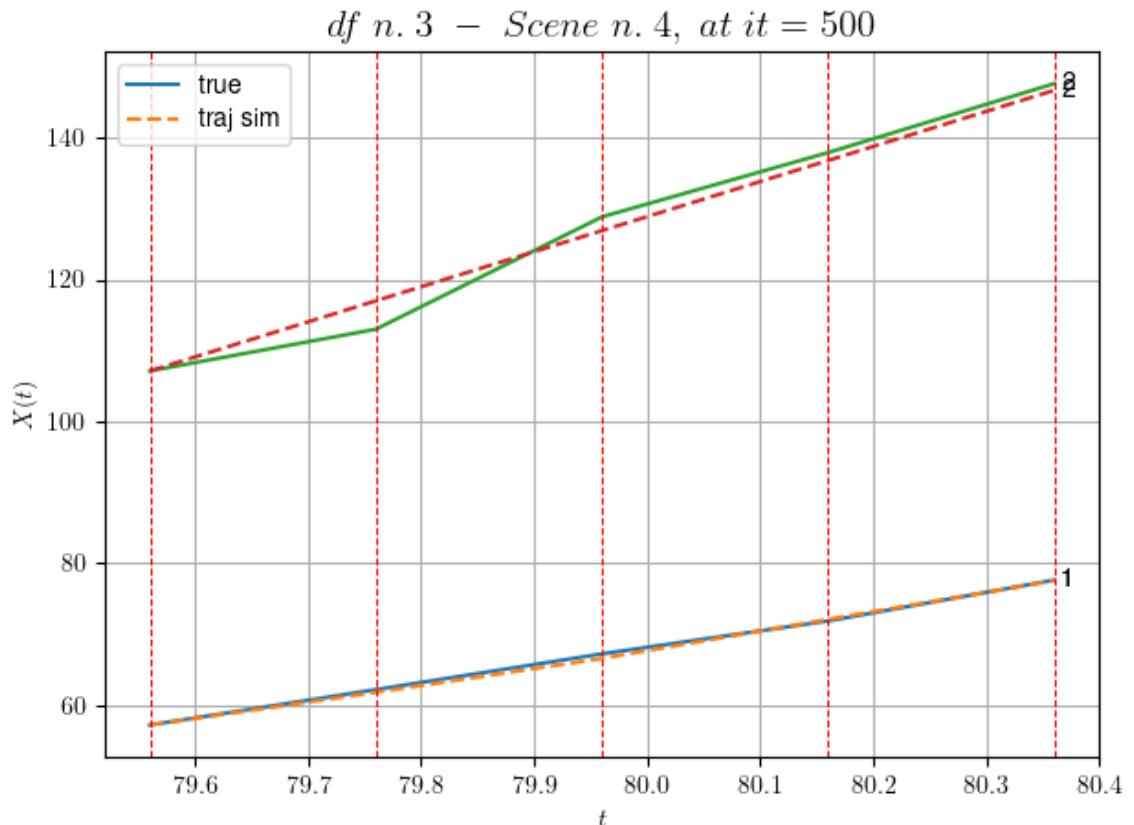


For scene 17/60:

* After LR finder: LR_NN=1e-05 with mse=2.4996048757293883
at it=24
* v0 = 34.86837809331661
* MSE = 0.5512747639956186
* iterations = 500

DataFrame n.3. Scene n.18/60

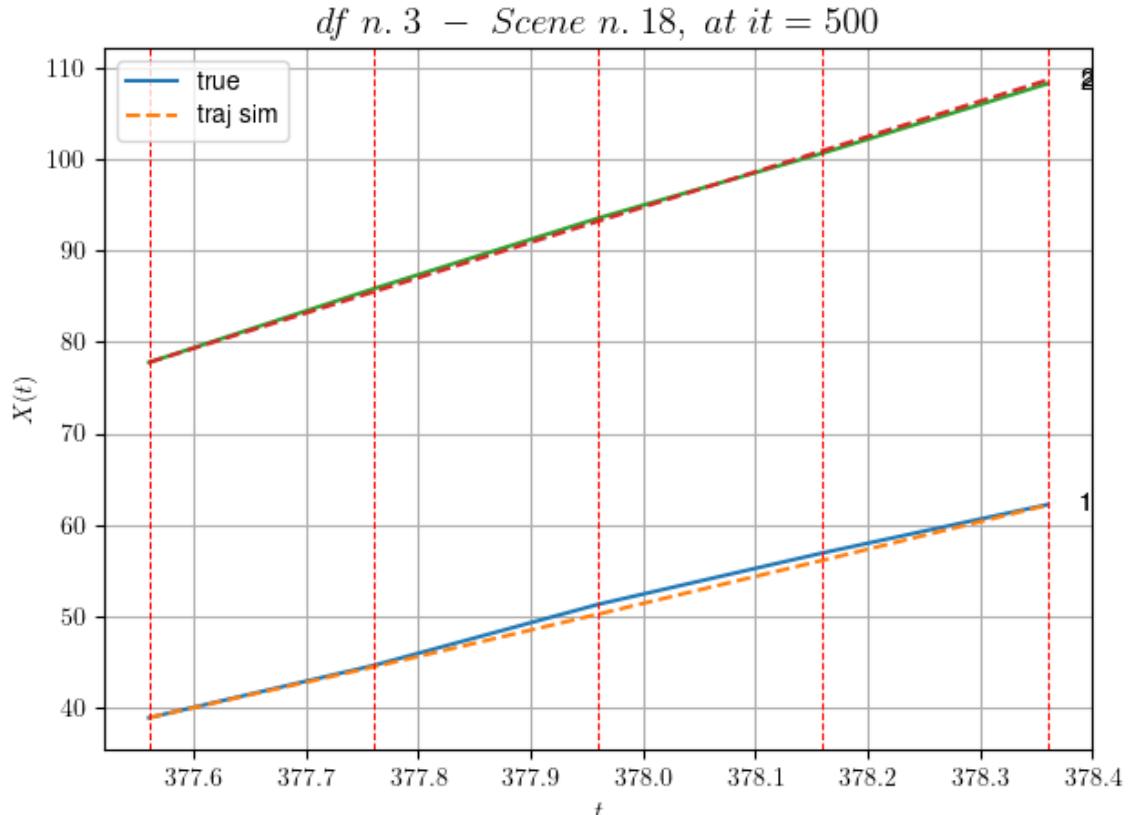
We have 4 time intervals inside [79.56,80.36]



For scene 18/60:
* After LR finder: LR_NN=0.0001 with mse=53.06775782773993
at it=24
* v0 = 49.426361537308324
* MSE = 2.2517149611793235
* iterations = 500

DataFrame n.3. Scene n.19/60

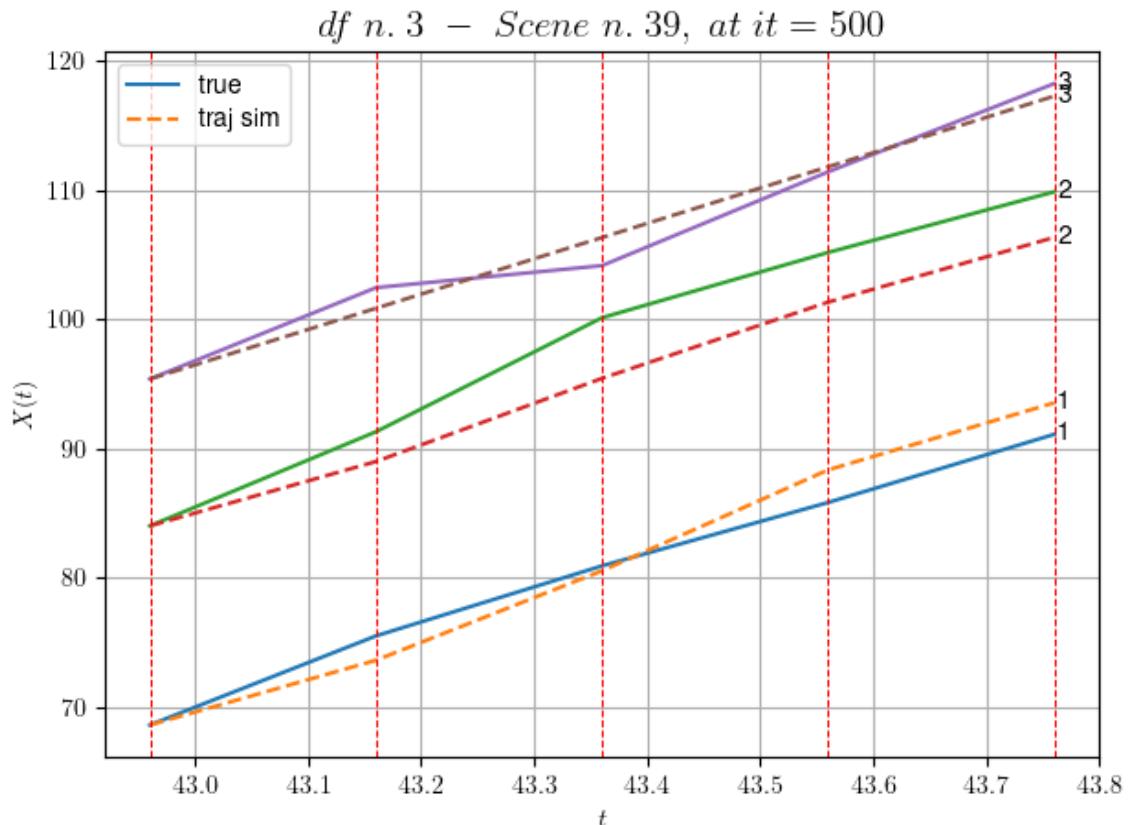
We have 4 time intervals inside [377.56,378.36]



For scene 19/60:
* After LR finder: LR_NN=1e-05 with mse=8.703894149219655 at it=24
* v0 = 38.59992828377917
* MSE = 0.2290111175096047
* iterations = 500

DataFrame n.3. Scene n.20/60

We have 4 time intervals inside [42.96,43.76]

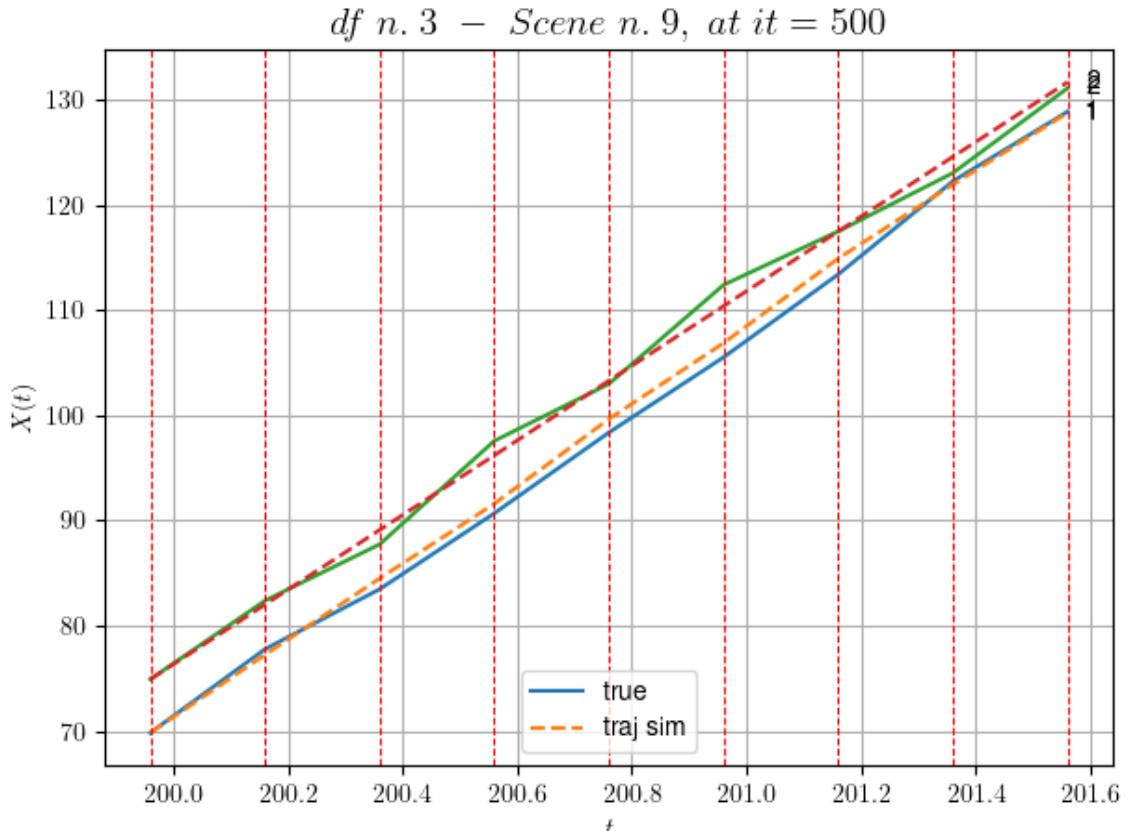


For scene 20/60:

* After LR finder: LR_NN=0.001 with mse=22.644045588988902
at it=24
* $v_0 = 27.350673440922456$
* MSE = 5.253089822945163
* iterations = 500

DataFrame n.3. Scene n.21/60

We have 8 time intervals inside [199.96, 201.56]

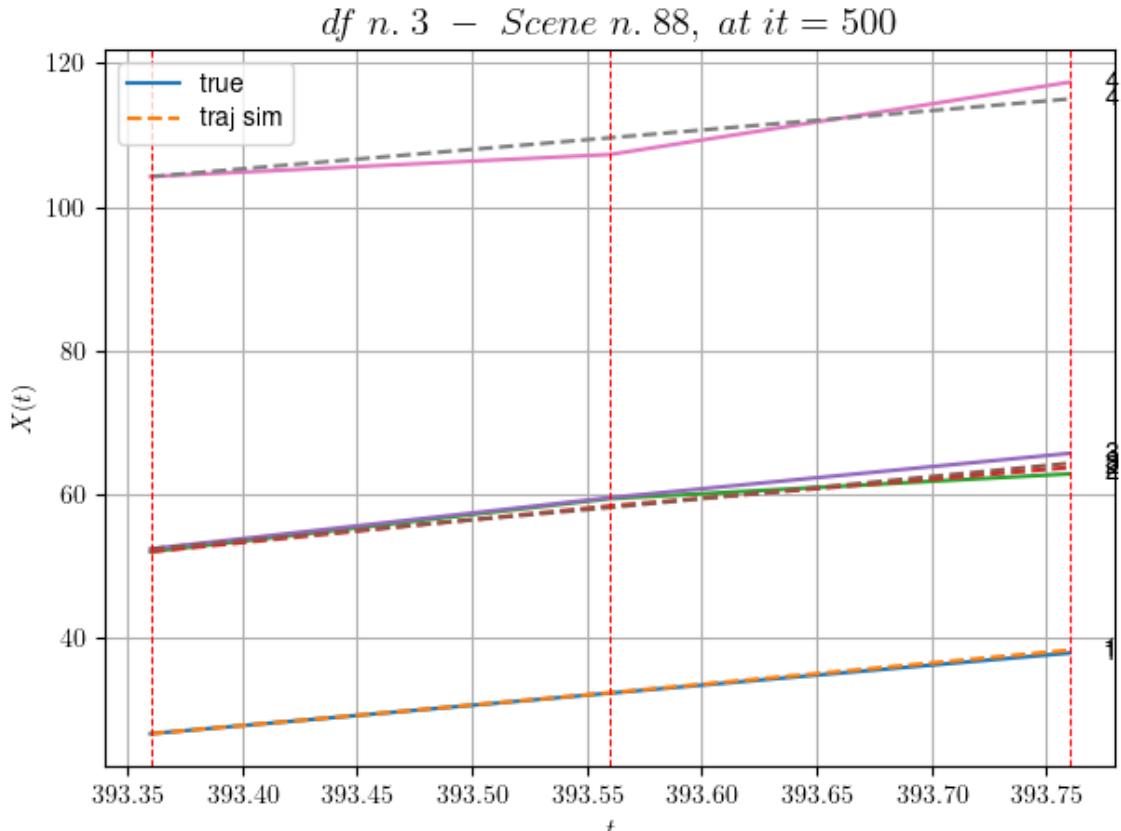


For scene 21/60:

* After LR finder: LR_NN=0.0001 with mse=15.721372919727079
at it=24
* v0 = 35.48263392775833
* MSE = 0.8928118932544218
* iterations = 500

DataFrame n.3. Scene n.22/60

We have 2 time intervals inside [393.36,393.76]

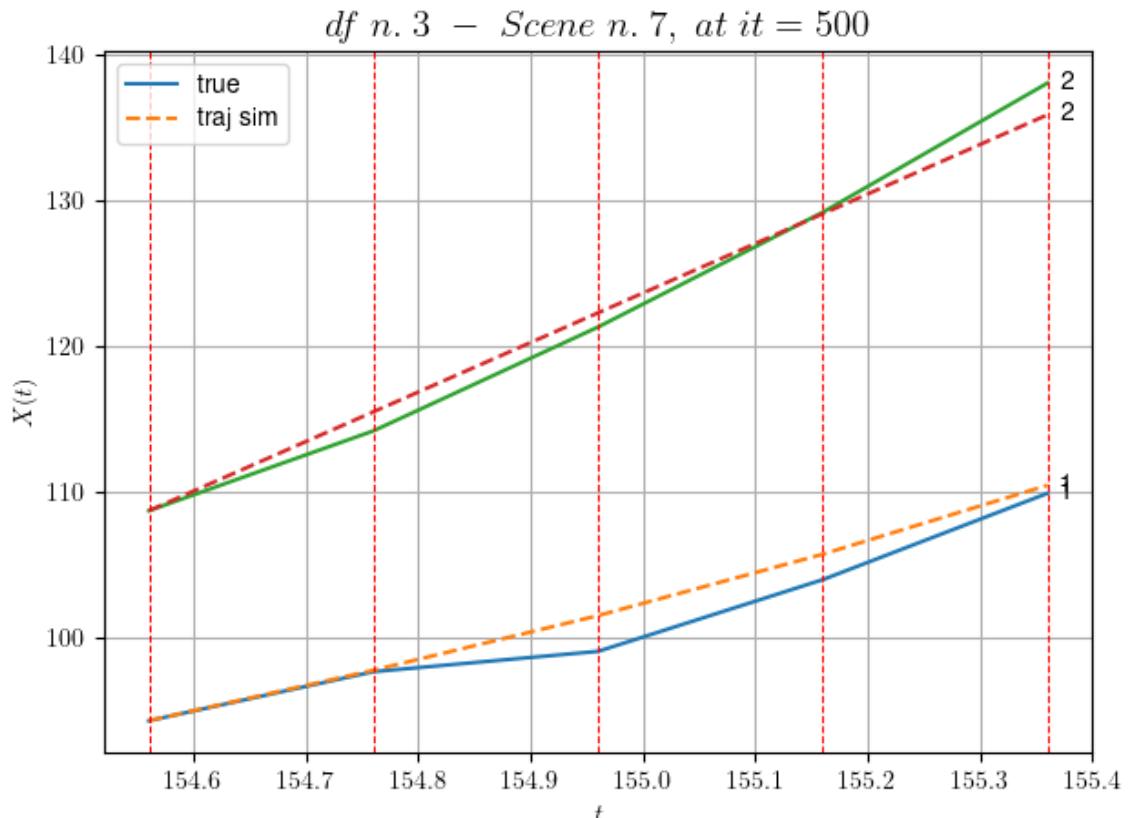


For scene 22/60:

* After LR finder: LR_NN=5e-05 with mse=16.11256694383444 at it=24
* v0 = 27.006293536404915
* MSE = 1.3421891561454649
* iterations = 500

DataFrame n.3. Scene n.23/60

We have 4 time intervals inside [154.56,155.36]

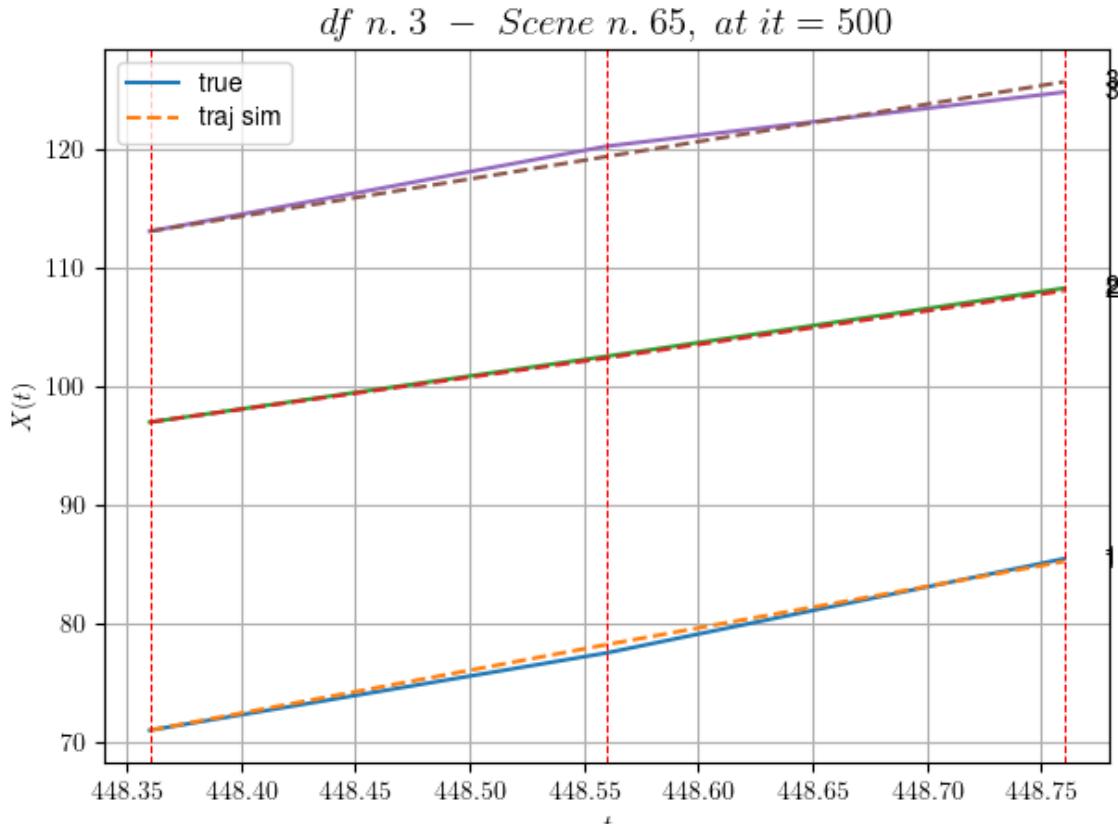


For scene 23/60:

* After LR finder: LR_NN=0.0001 with mse=4.0113887695724015
at it=24
* v0 = 33.88242010375711
* MSE = 1.6725990671709048
* iterations = 500

DataFrame n.3. Scene n.24/60

We have 2 time intervals inside [448.36,448.76]

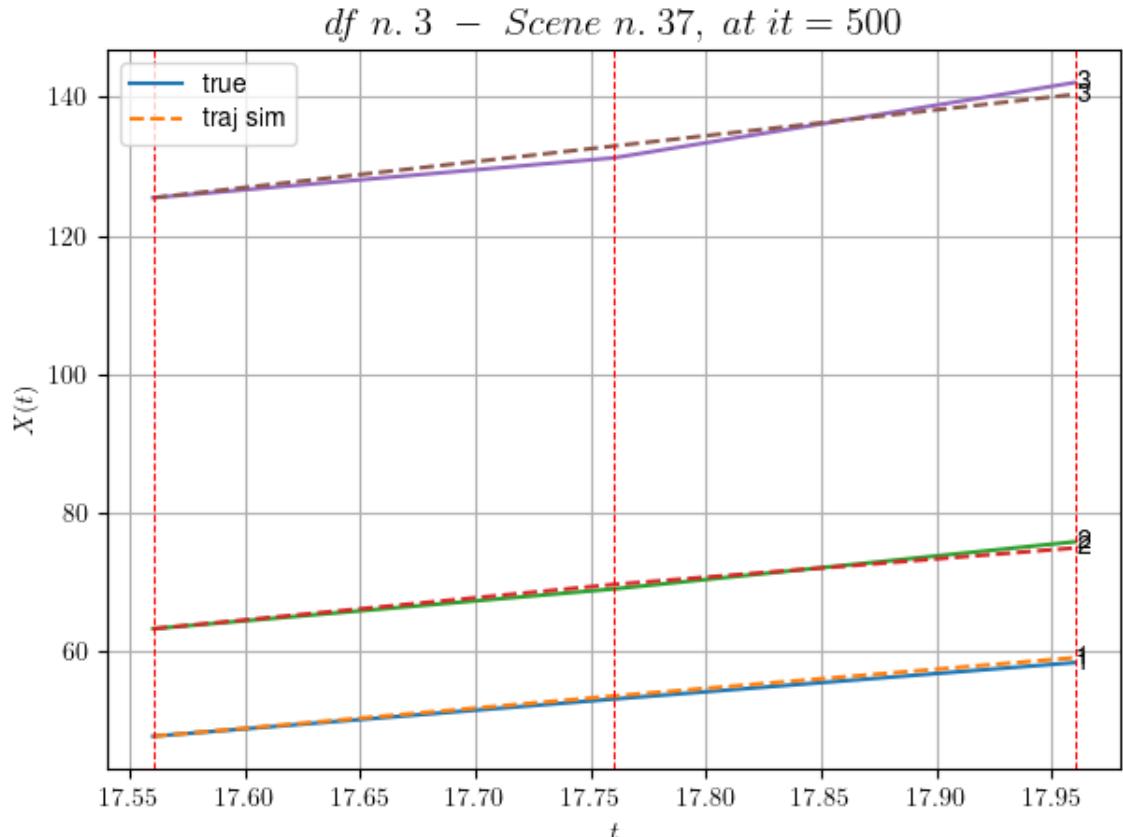


For scene 24/60:

* After LR finder: $LR_NN=5e-05$ with $mse=0.5833021557485798$
at it=24
* $v_0 = 31.58504818637682$
* $MSE = 0.2390677586936568$
* iterations = 500

DataFrame n.3. Scene n.25/60

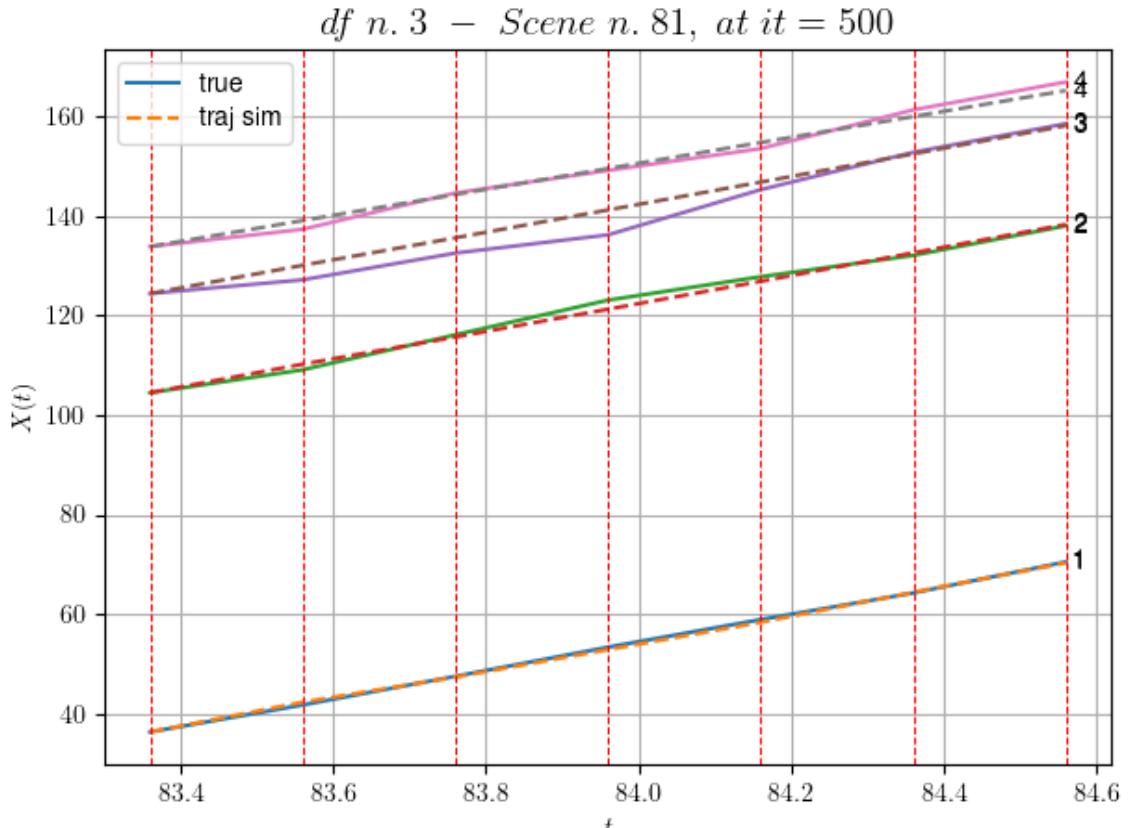
We have 2 time intervals inside [17.56,17.96]



For scene 25/60:
* After LR finder: LR_NN=0.0001 with mse=9.07424124640845 at it=24
* v0 = 37.341608941888886
* MSE = 0.7767959334681511
* iterations = 500

DataFrame n.3. Scene n.26/60

We have 6 time intervals inside [83.36,84.56]

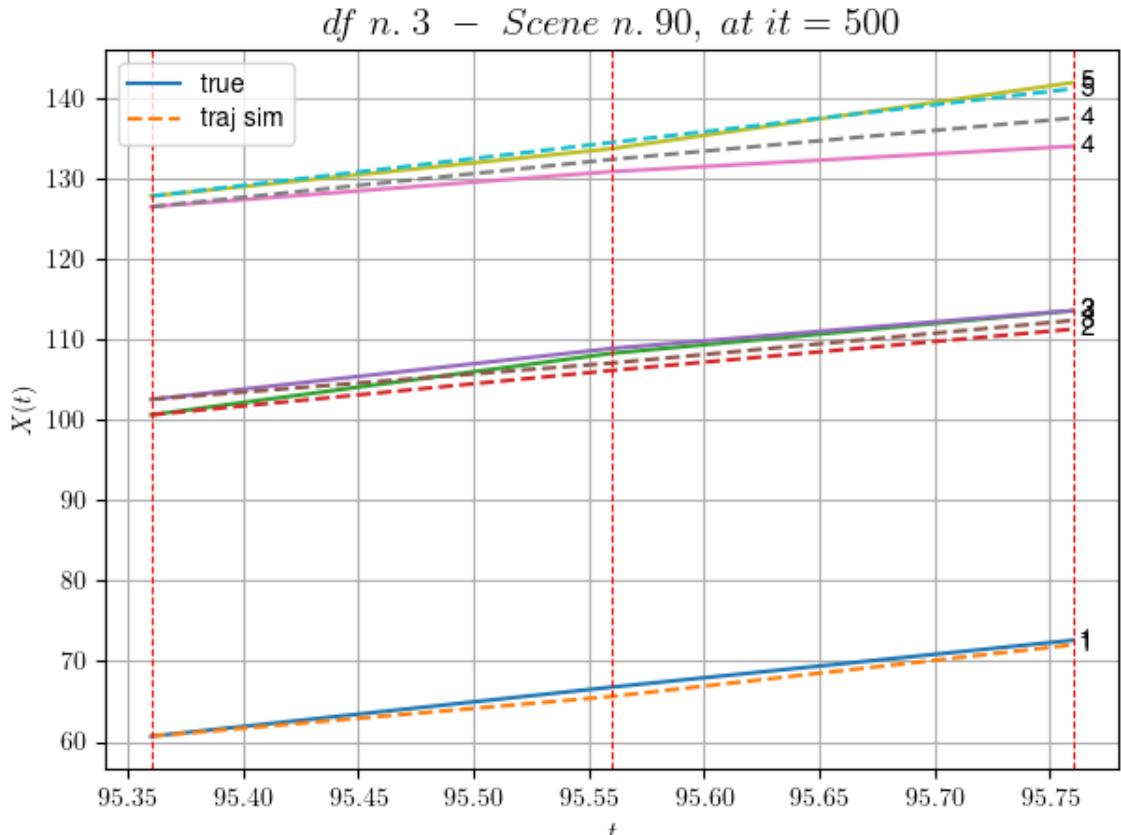


For scene 26/60:

* After LR finder: LR_NN=0.0001 with mse=106.38772568854878
at it=24
* v0 = 26.10772419731449
* MSE = 2.175515967421635
* iterations = 500

DataFrame n.3. Scene n.27/60

We have 2 time intervals inside [95.36,95.76]

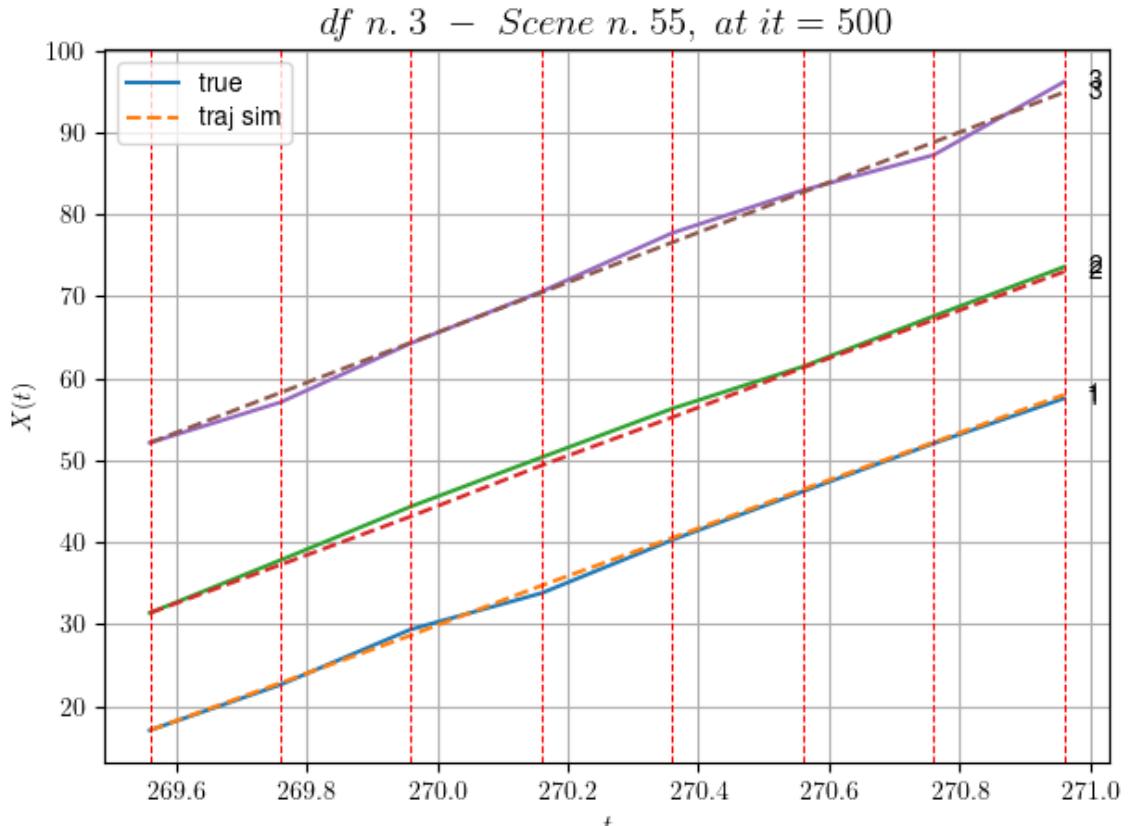


For scene 27/60:

* After LR finder: $\text{LR_NN}=0.0005$ with $\text{mse}=16.901037347939994$
at $\text{it}=24$
* $v_0 = 33.35137428698119$
* $\text{MSE} = 2.007312095761061$
* iterations = 500

DataFrame n.3. Scene n.28/60

We have 7 time intervals inside $[269.56, 270.96]$

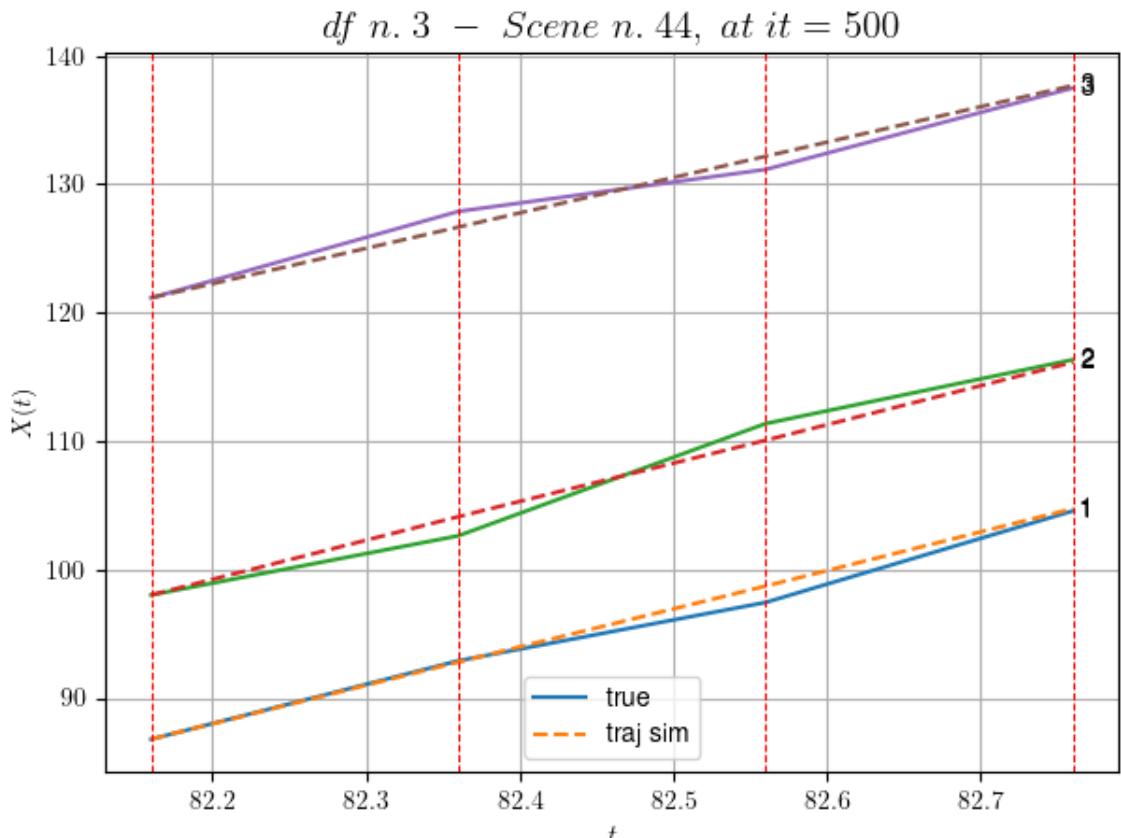


For scene 28/60:

* After LR finder: $\text{LR_NN}=0.0005$ with $\text{mse}=6.025905255136359$
at it=24
* $v_0 = 30.539175669712282$
* $\text{MSE} = 0.45313602561757255$
* iterations = 500

DataFrame n.3. Scene n.29/60

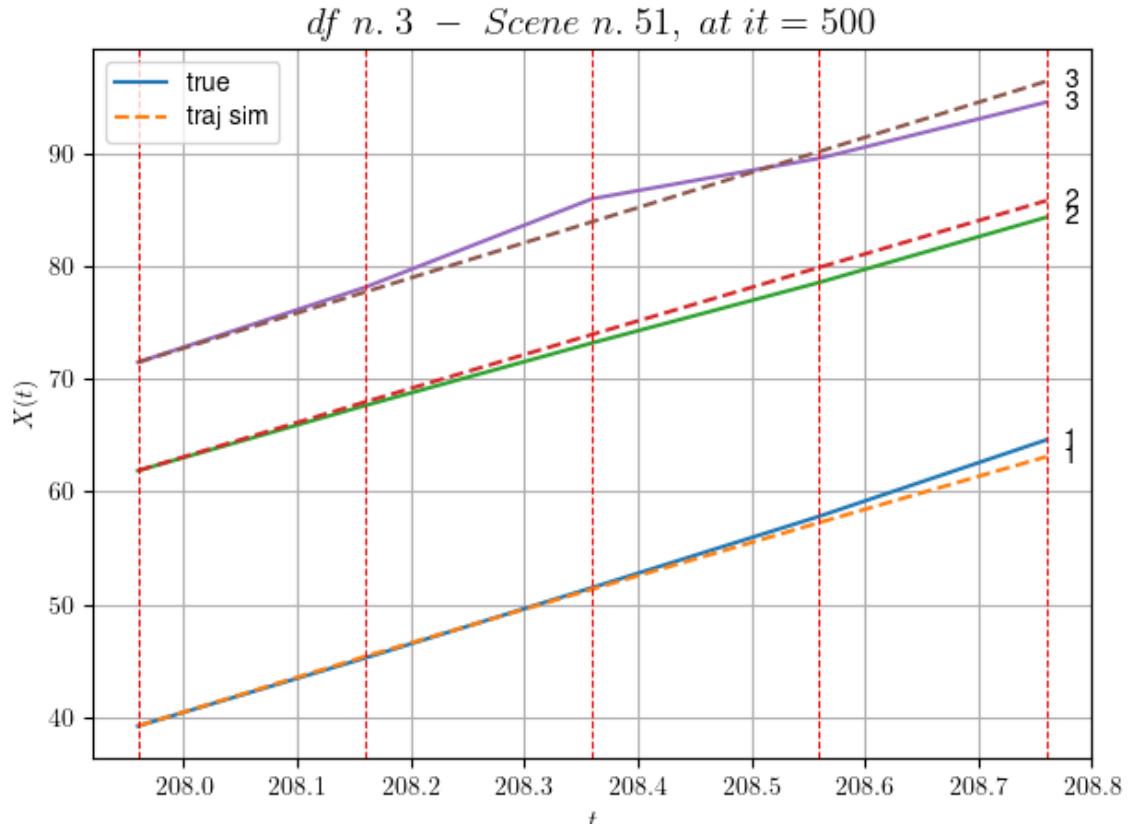
We have 3 time intervals inside [82.16,82.76]



For scene 29/60:
* After LR finder: LR_NN=0.0001 with mse=7.5160233374634275
at it=24
* v0 = 27.550237413707396
* MSE = 0.6584640288028762
* iterations = 500

DataFrame n.3. Scene n.30/60

We have 4 time intervals inside [207.96,208.76]

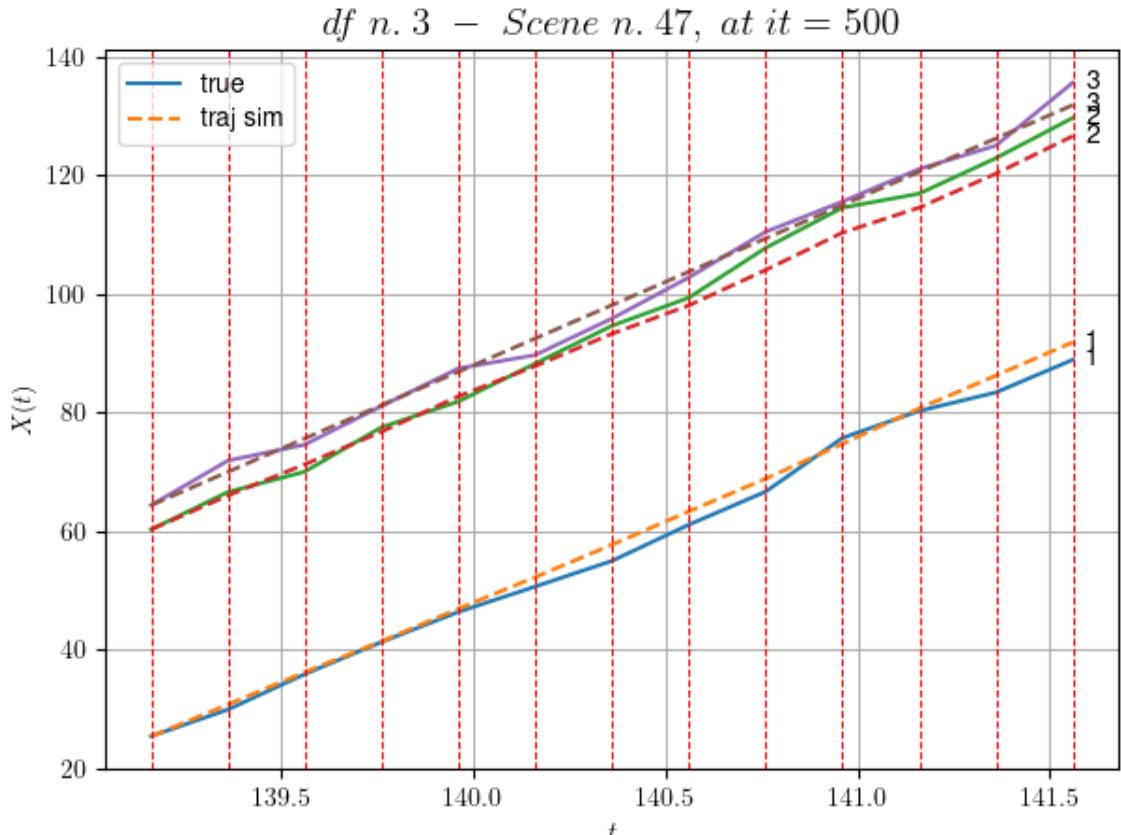


For scene 30/60:

* After LR finder: LR_NN=0.0005 with mse=10.91133095640886
at it=24
* v0 = 31.12490964519055
* MSE = 0.9254263819116885
* iterations = 500

DataFrame n.3. Scene n.31/60

We have 12 time intervals inside [139.16, 141.56]



For scene 31/60:

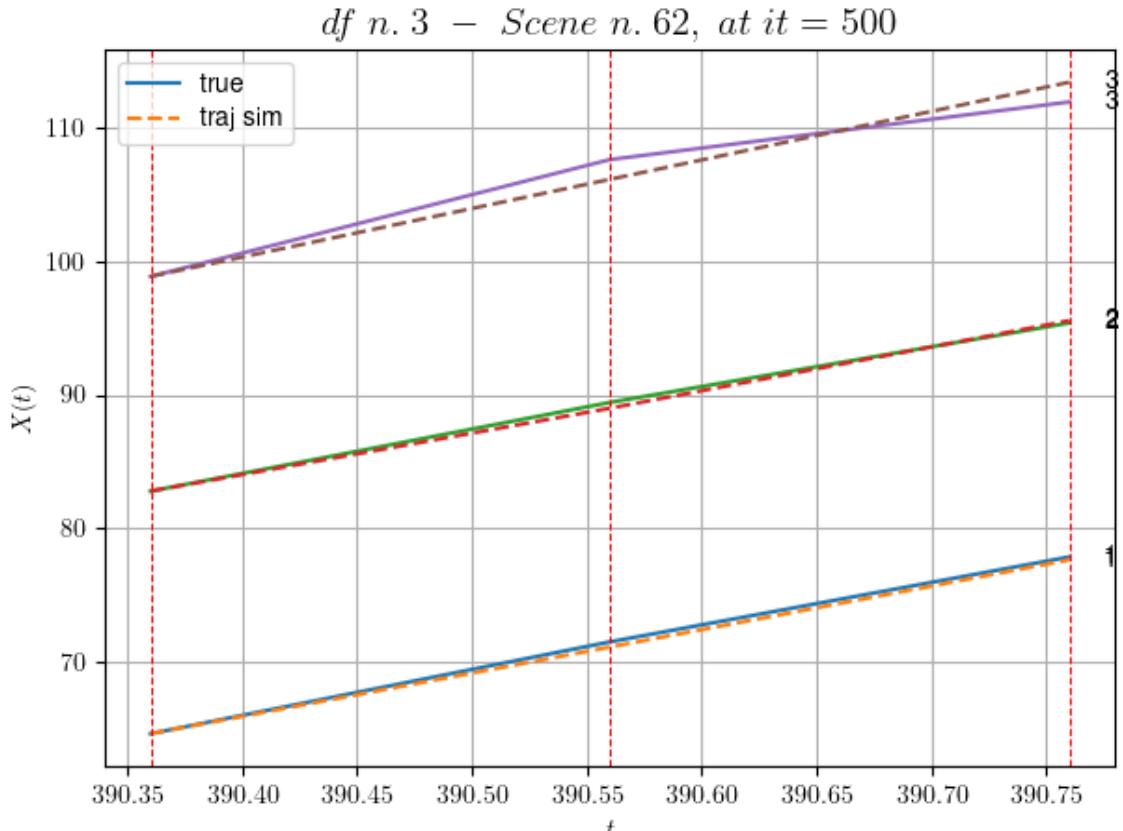
- * After LR finder: LR_NN=0.0005 with mse=291.6504865843053

at it=24

- * v0 = 28.144630567259174
- * MSE = 2.365214673874203
- * iterations = 500

DataFrame n.3. Scene n.32/60

We have 2 time intervals inside [390.36,390.76]

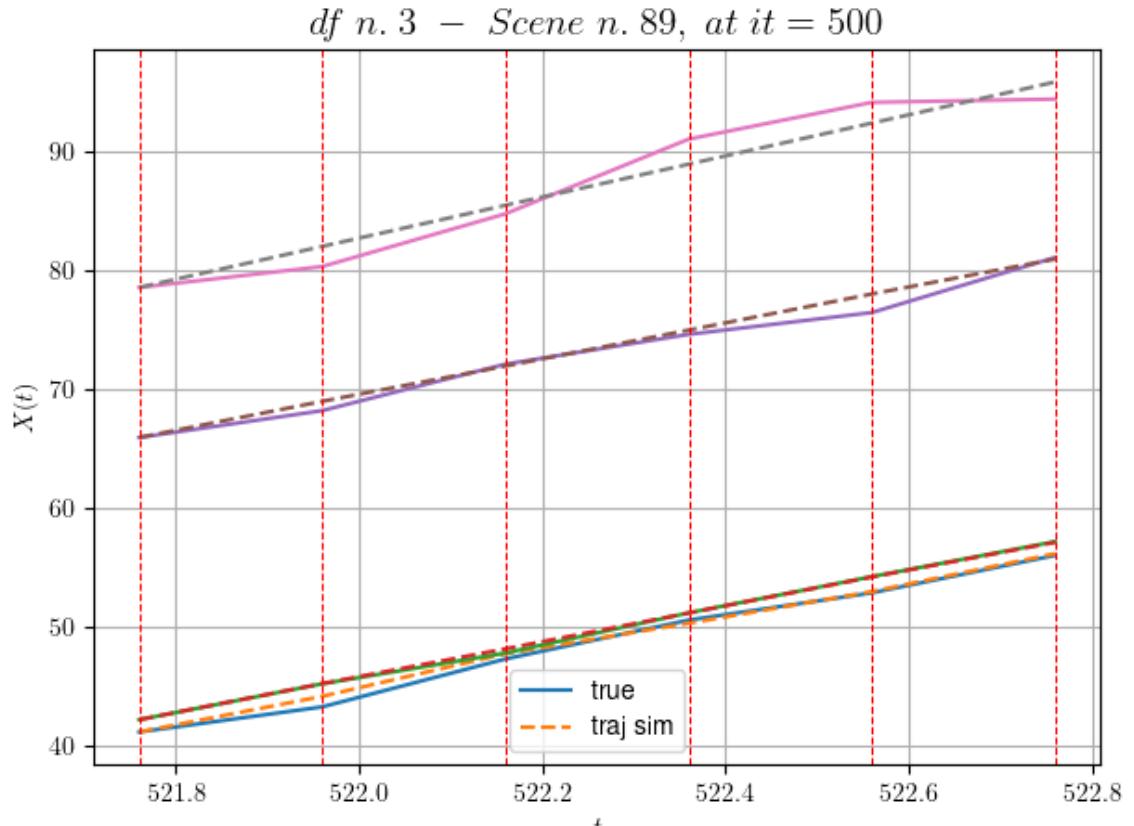


For scene 32/60:

- * After LR finder: LR_NN=0.0001 with mse=1.05319204768254 at it=24
- * v0 = 36.35426043628988
- * MSE = 0.48739883342199414
- * iterations = 500

DataFrame n.3. Scene n.33/60

We have 5 time intervals inside [521.76, 522.76]

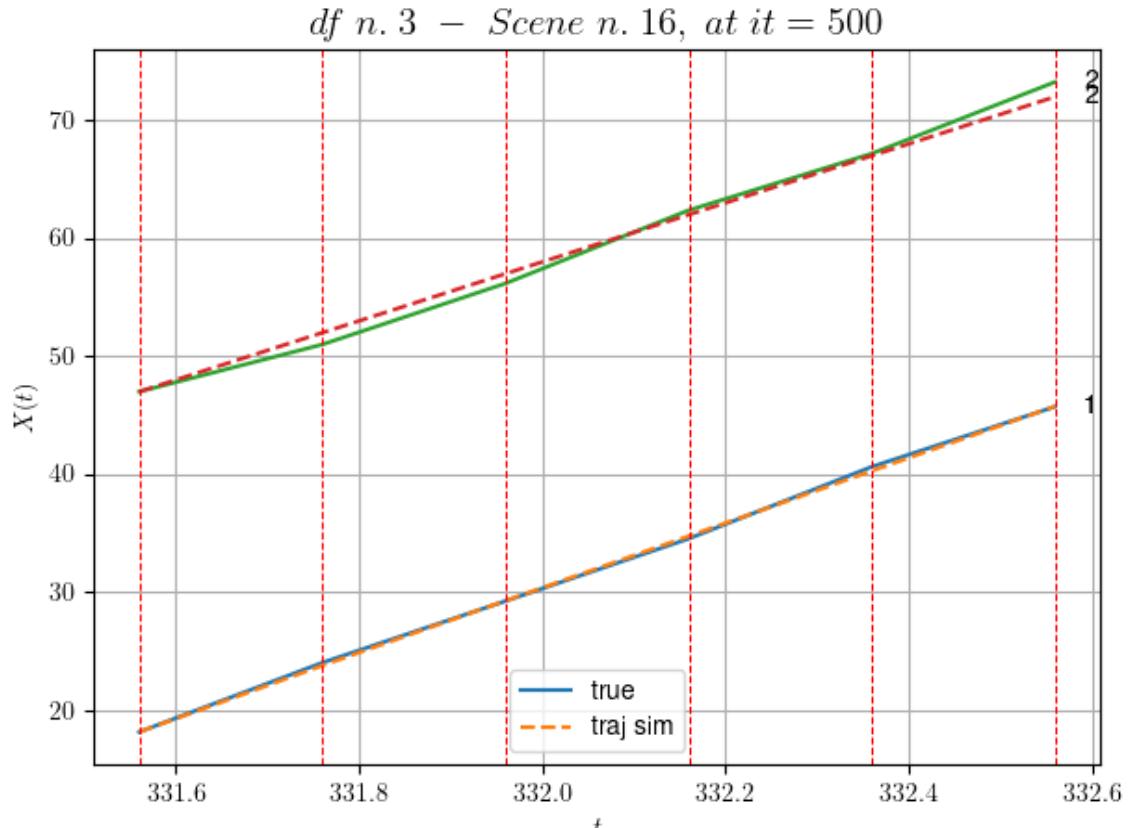


For scene 33/60:

* After LR finder: LR_NN=0.0005 with mse=27.00316987194728
at it=24
* $v_0 = 17.247787667047092$
* MSE = 0.716658234759219
* iterations = 500

DataFrame n.3. Scene n.34/60

We have 5 time intervals inside [331.56,332.56]

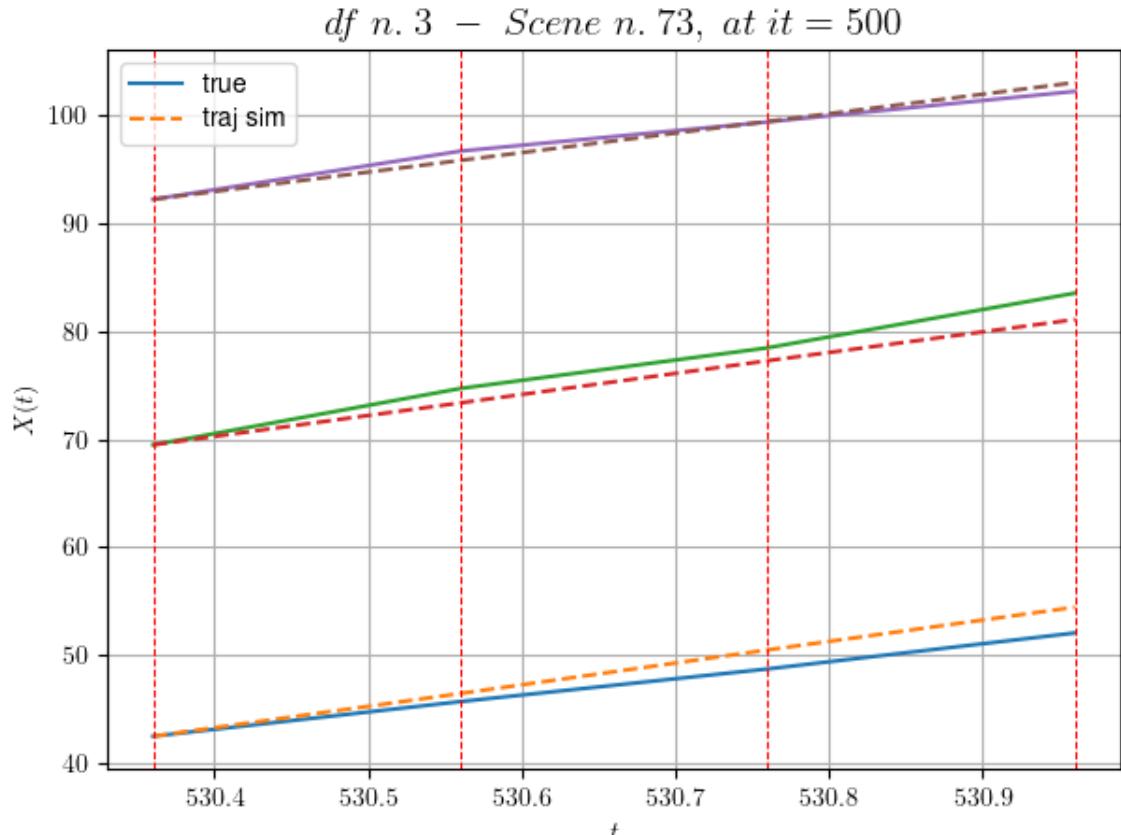


For scene 34/60:

* After LR finder: LR_NN=5e-05 with mse=3.960894059361317 at it=24
* v0 = 25.00216687994919
* MSE = 0.260918715157674
* iterations = 500

DataFrame n.3. Scene n.35/60

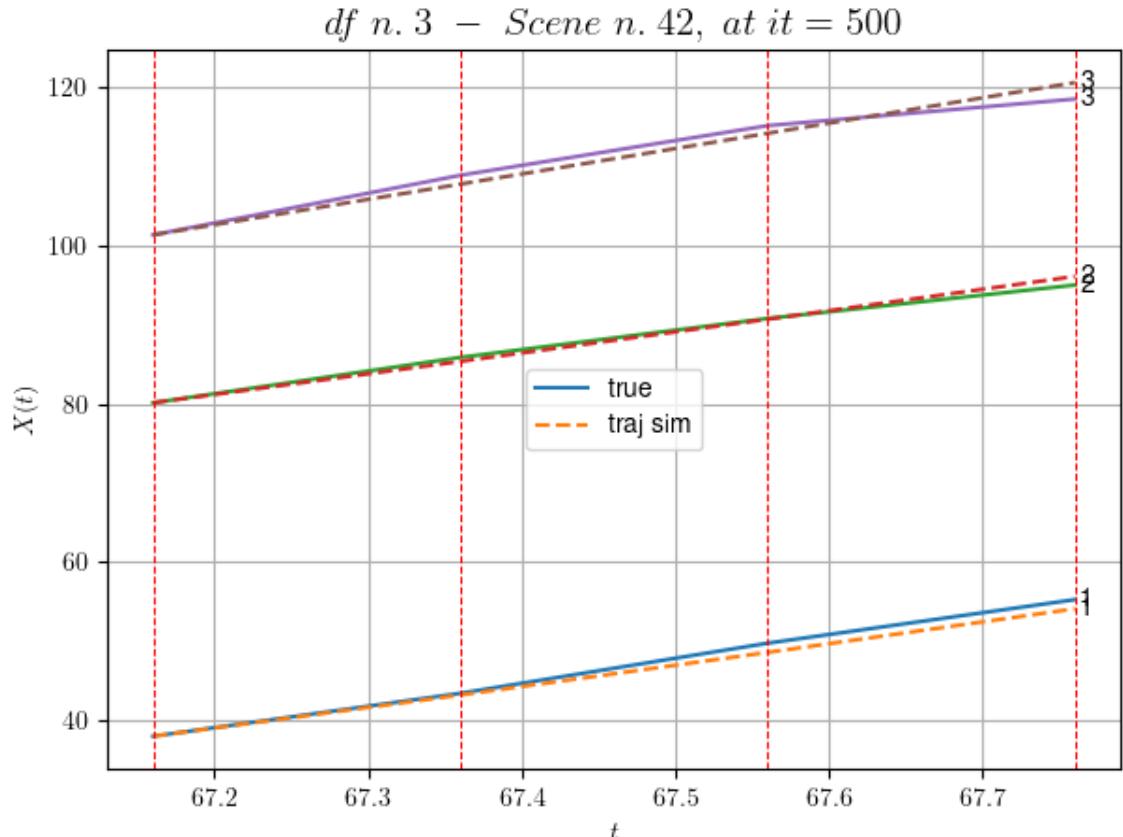
We have 3 time intervals inside [530.36,530.96]



For scene 35/60:
* After LR finder: LR_NN=0.0001 with mse=10.948190667419667
at it=24
* v0 = 18.054855152784263
* MSE = 1.6651586011152124
* iterations = 500

DataFrame n.3. Scene n.36/60

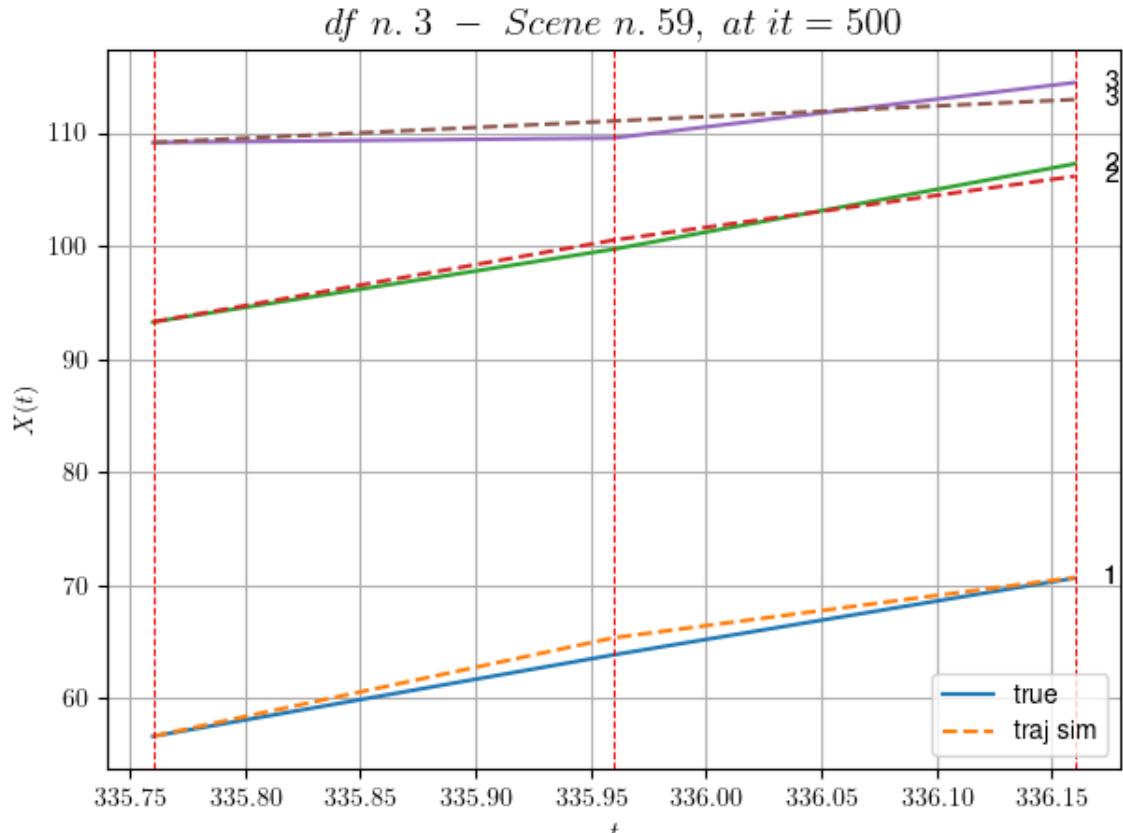
We have 3 time intervals inside [67.16,67.76]



For scene 36/60:
* After LR finder: LR_NN=0.0001 with mse=4.235875092359518
at it=24
* v0 = 32.13932154245633
* MSE = 0.7095893216958241
* iterations = 500

DataFrame n.3. Scene n.37/60

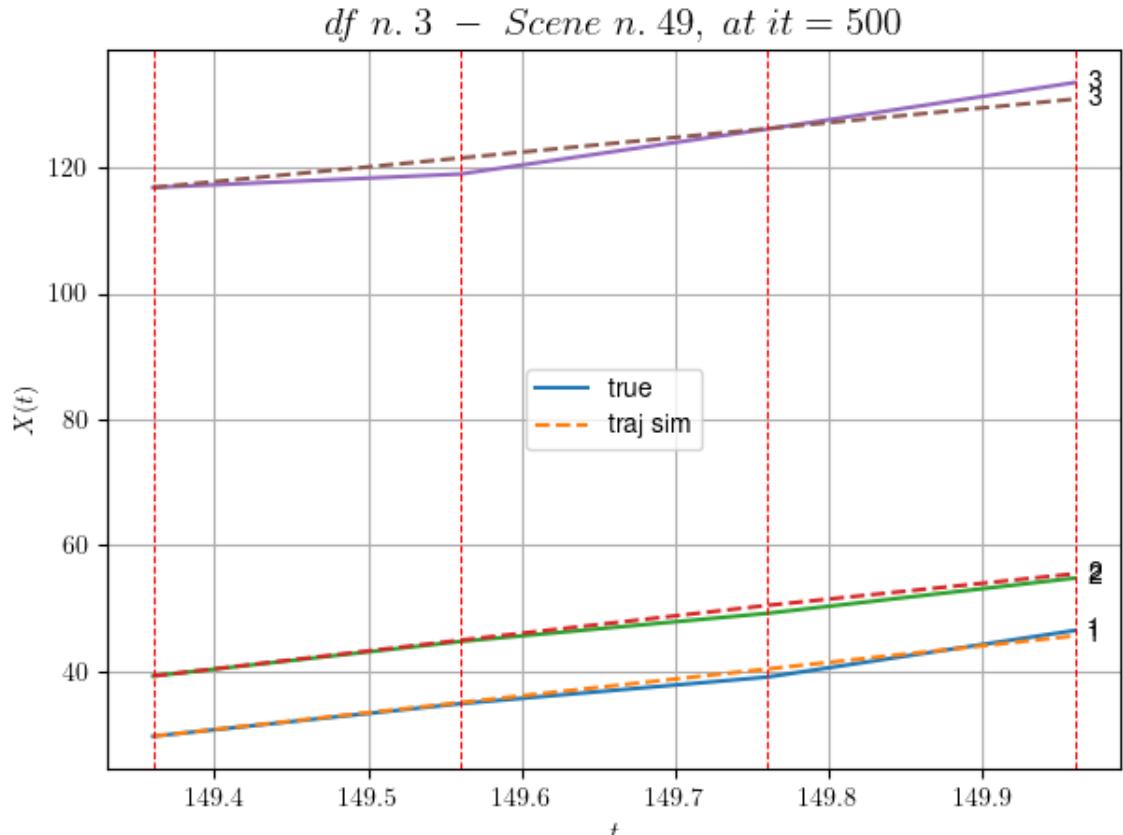
We have 2 time intervals inside [335.76, 336.16]



For scene 37/60:
* After LR finder: LR_NN=0.0005 with mse=16.402311267733452
at it=24
* v0 = 9.495680524399235
* MSE = 0.9170255907940756
* iterations = 500

DataFrame n.3. Scene n.38/60

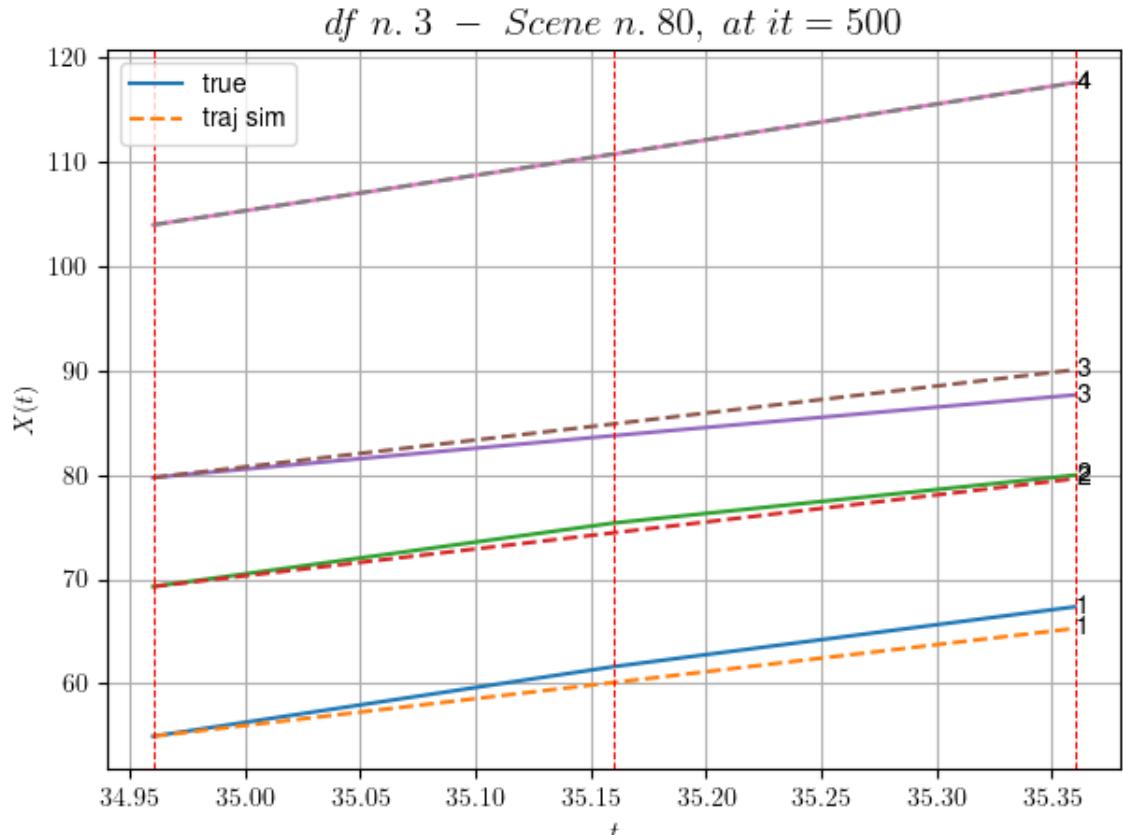
We have 3 time intervals inside [149.36, 149.96]



For scene 38/60:
* After LR finder: LR_NN=5e-05 with mse=25.041782313454576
at it=24
* v0 = 23.44355532852098
* MSE = 1.4646470796530988
* iterations = 500

DataFrame n.3. Scene n.39/60

We have 2 time intervals inside [34.96,35.36]

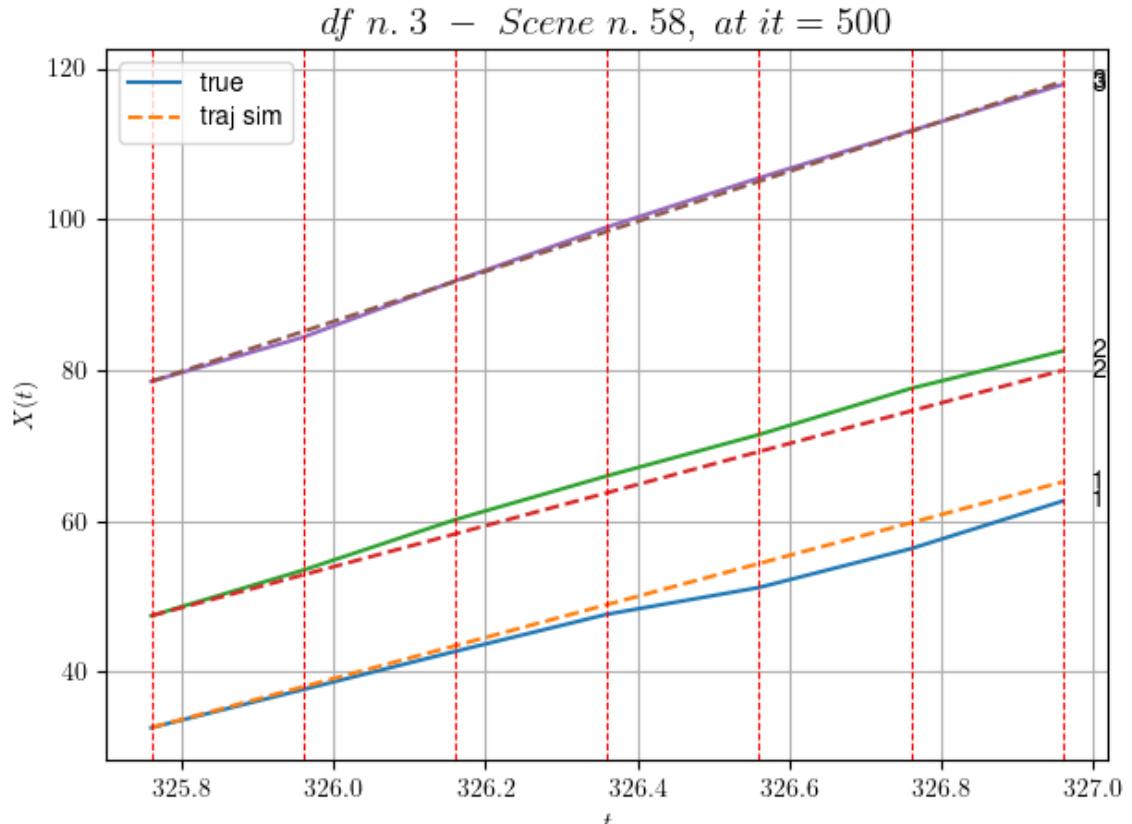


For scene 39/60:

* After LR finder: $\text{LR_NN}=5\text{e-}05$ with $\text{mse}=9.7655259640166$ at
it=24
* $v_0 = 34.044524530898556$
* $\text{MSE} = 1.2023122112700473$
* iterations = 500

DataFrame n.3. Scene n.40/60

We have 6 time intervals inside $[325.76, 326.96]$

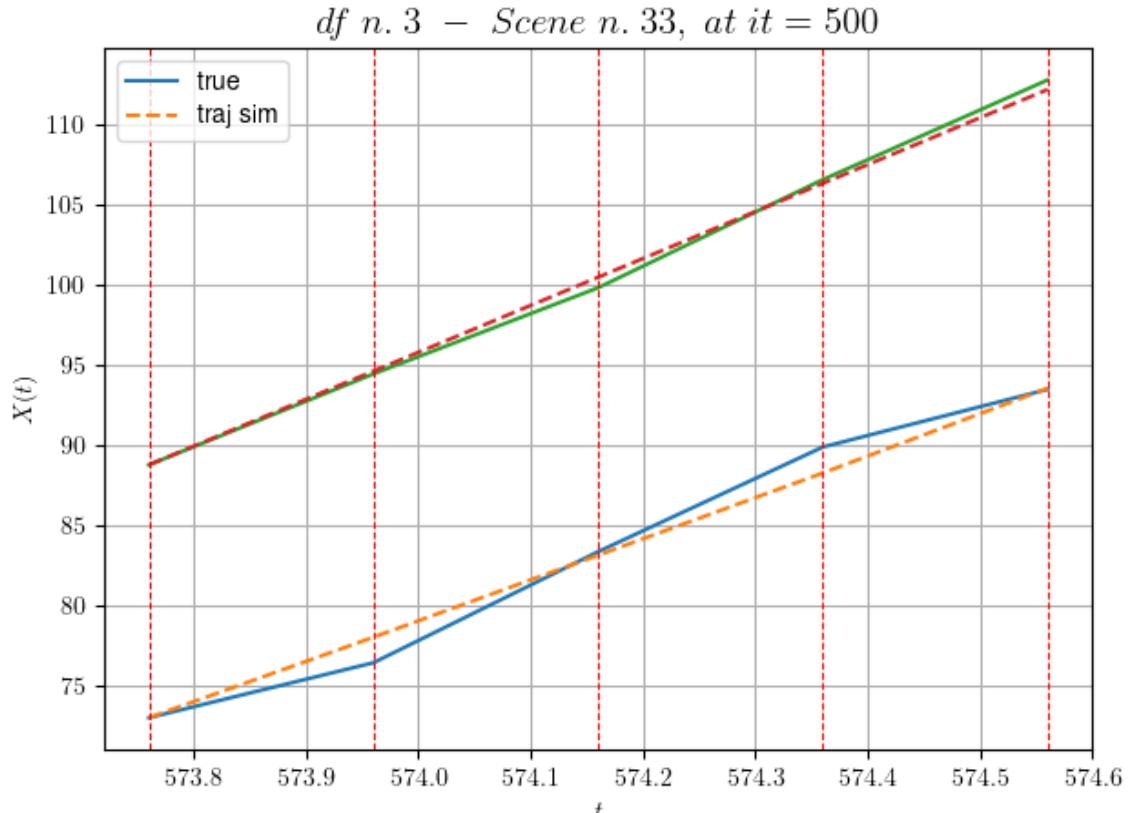


For scene 40/60:

* After LR finder: $LR_NN=5e-05$ with $mse=11.488096329359683$
at it=24
* $v_0 = 33.13555230710697$
* $MSE = 2.6396180870482846$
* iterations = 500

DataFrame n.3. Scene n.41/60

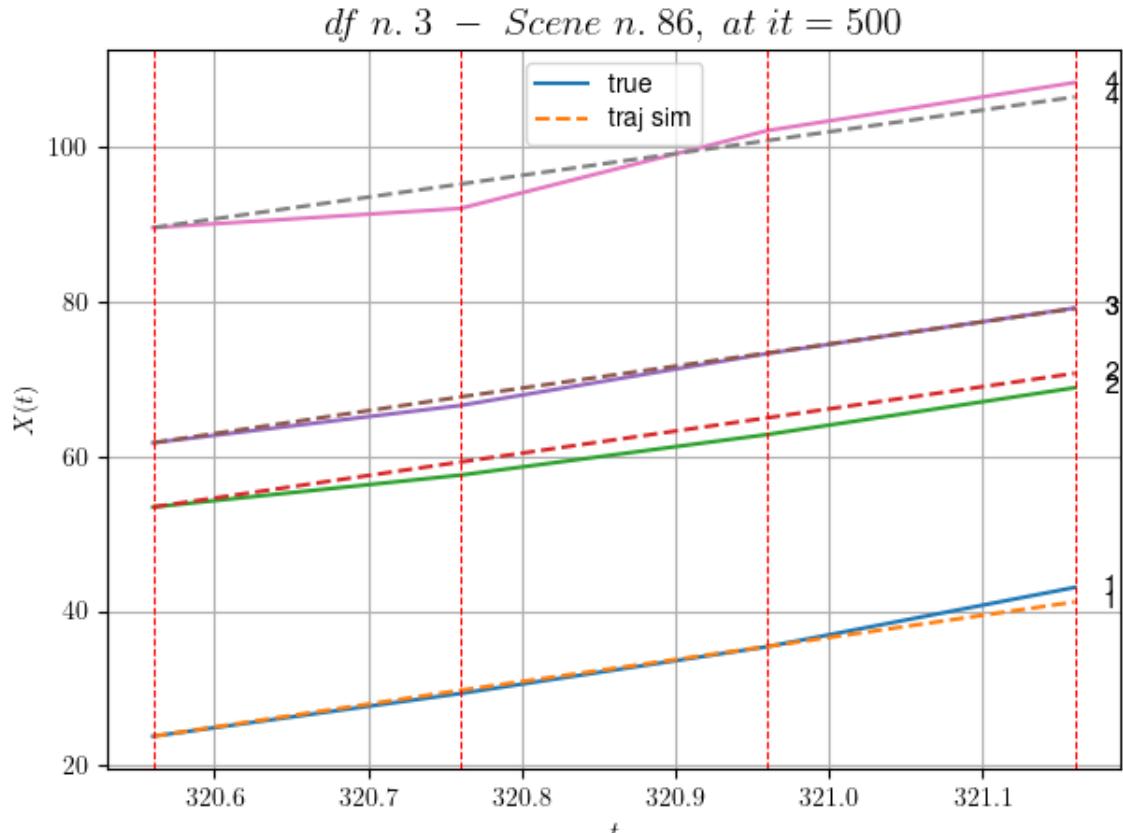
We have 4 time intervals inside [573.76, 574.56]



For scene 41/60:
* After LR finder: $LR_NN=0.0001$ with $mse=0.6192452628163465$
at it=24
* $v_0 = 29.32939981960106$
* MSE = 0.6103315526464352
* iterations = 500

DataFrame n.3. Scene n.42/60

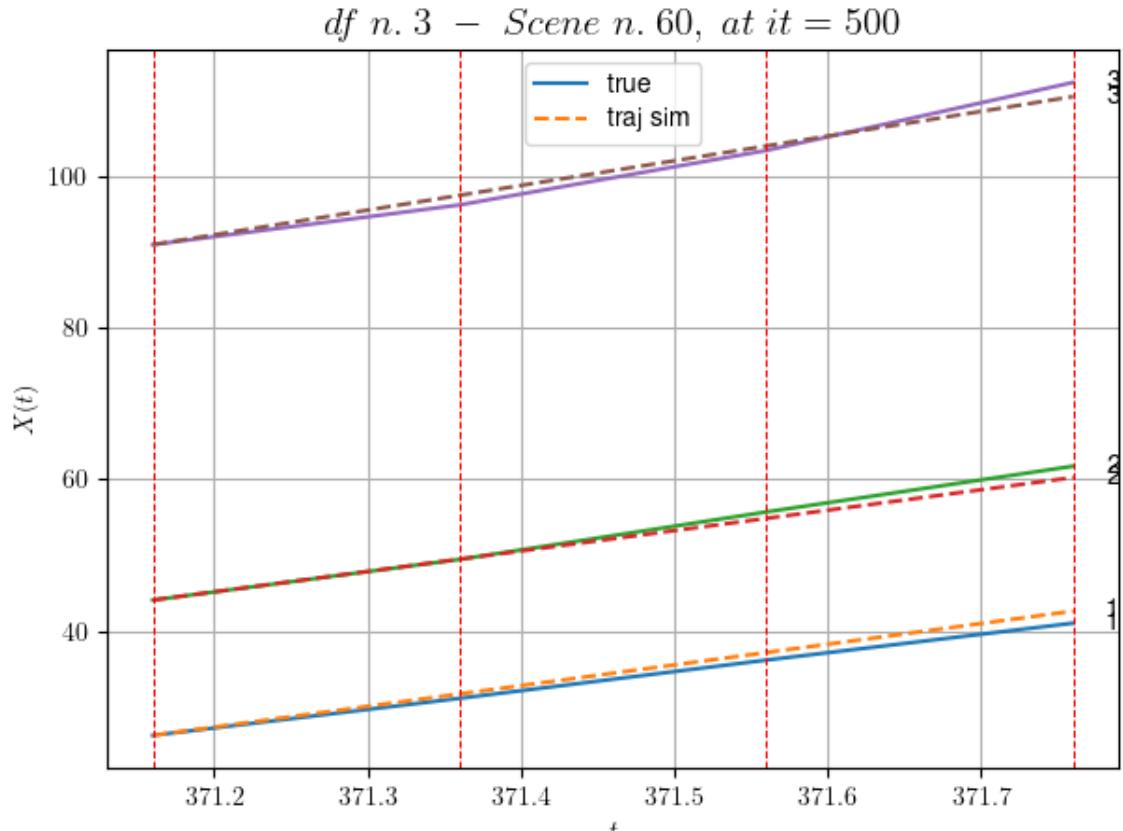
We have 3 time intervals inside [320.56,321.16]



For scene 42/60:
* After LR finder: LR_NN=0.0001 with mse=8.135907388325185
at it=24
* v0 = 28.130140949141975
* MSE = 1.233621889982472
* iterations = 500

DataFrame n.3. Scene n.43/60

We have 3 time intervals inside [371.16,371.76]

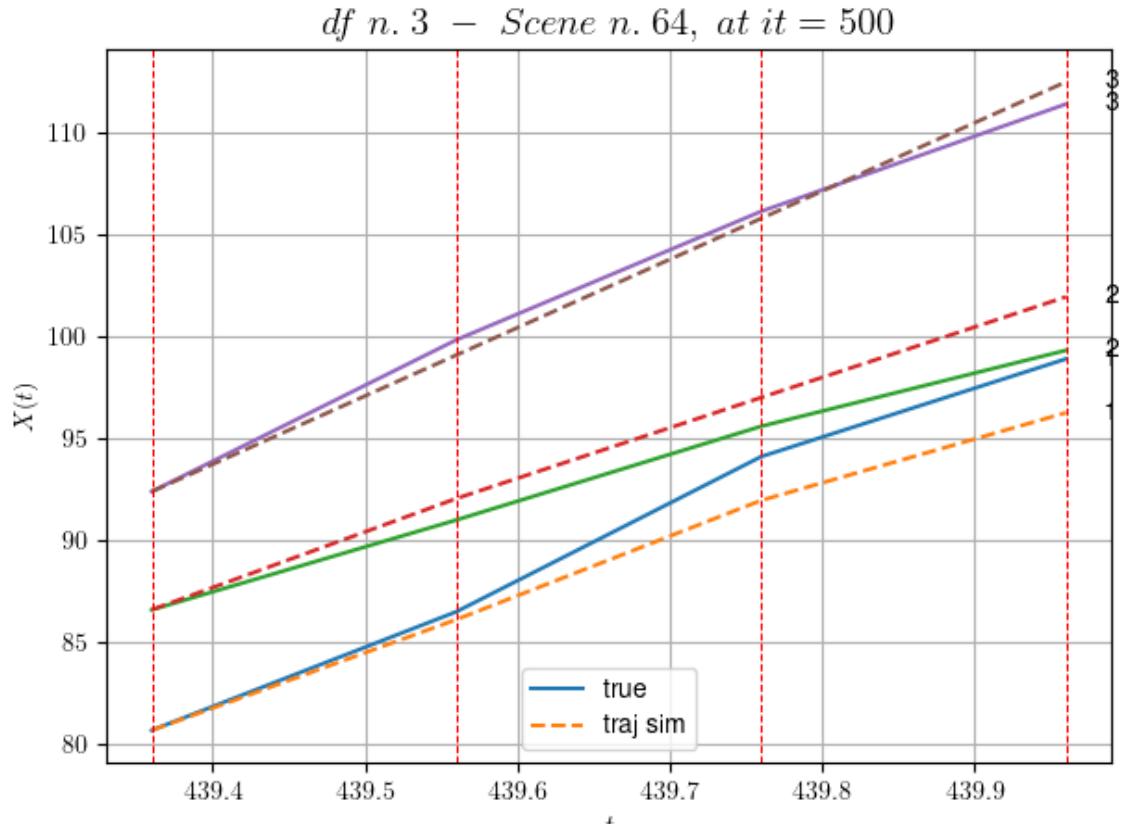


For scene 43/60:

- * After LR finder: $\text{LR_NN}=1e-05$ with $\text{mse}=7.81225631802517$ at $\text{it}=24$
- * $v_0 = 32.539507599227036$
- * $\text{MSE} = 1.0221302060694153$
- * $\text{iterations} = 500$

DataFrame n.3. Scene n.44/60

We have 3 time intervals inside $[439.36, 439.96]$

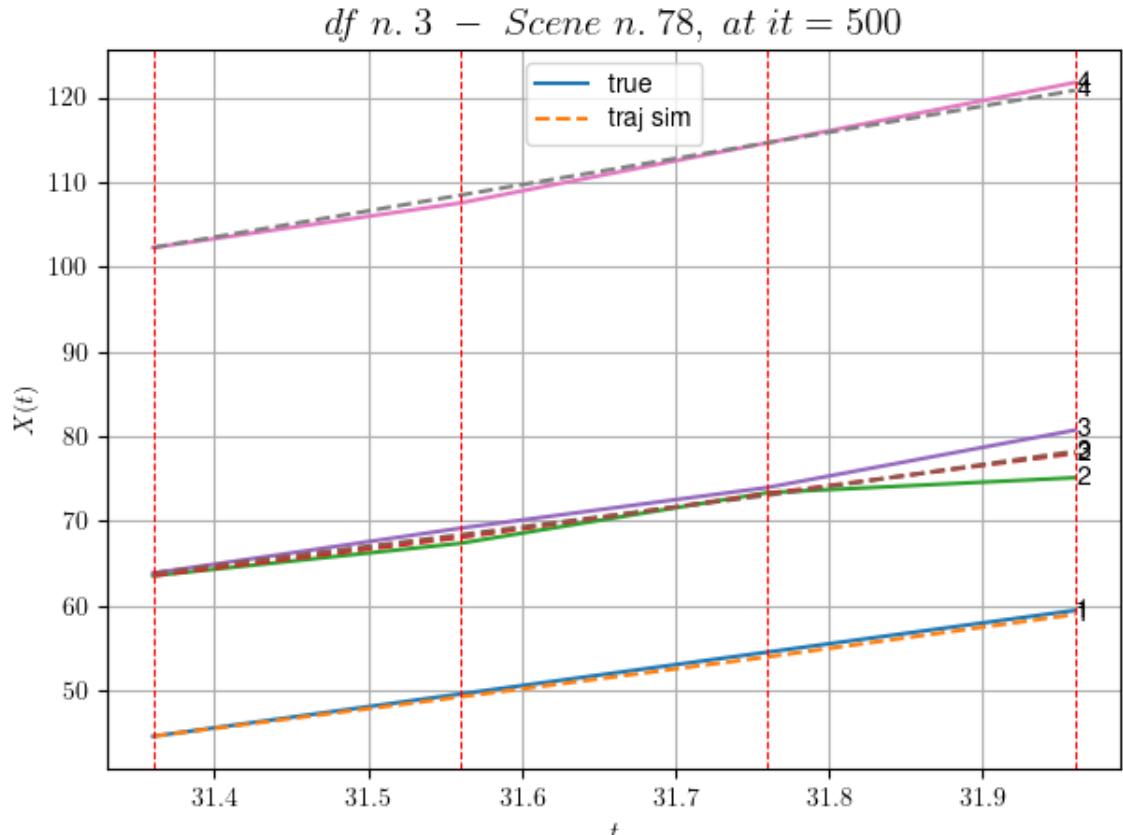


For scene 44/60:

* After LR finder: $LR_NN=0.0005$ with $mse=13.836233215577785$
at it=24
* $v_0 = 33.53637857272994$
* $MSE = 1.9672720561179495$
* iterations = 500

DataFrame n.3. Scene n.45/60

We have 3 time intervals inside [31.36,31.96]

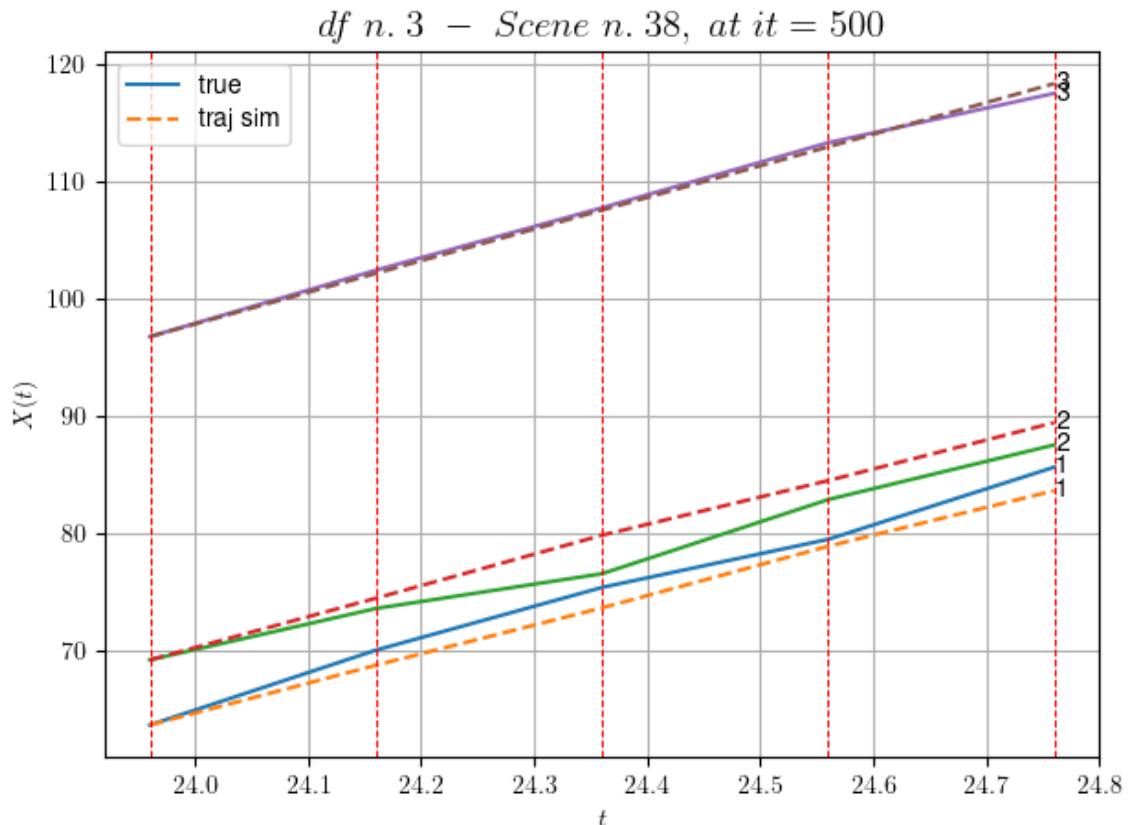


For scene 45/60:

* After LR finder: LR_NN=0.0005 with mse=16.354357019298806
at it=24
* v0 = 30.91717405915606
* MSE = 0.8899051895755774
* iterations = 500

DataFrame n.3. Scene n.46/60

We have 4 time intervals inside [23.96,24.76]

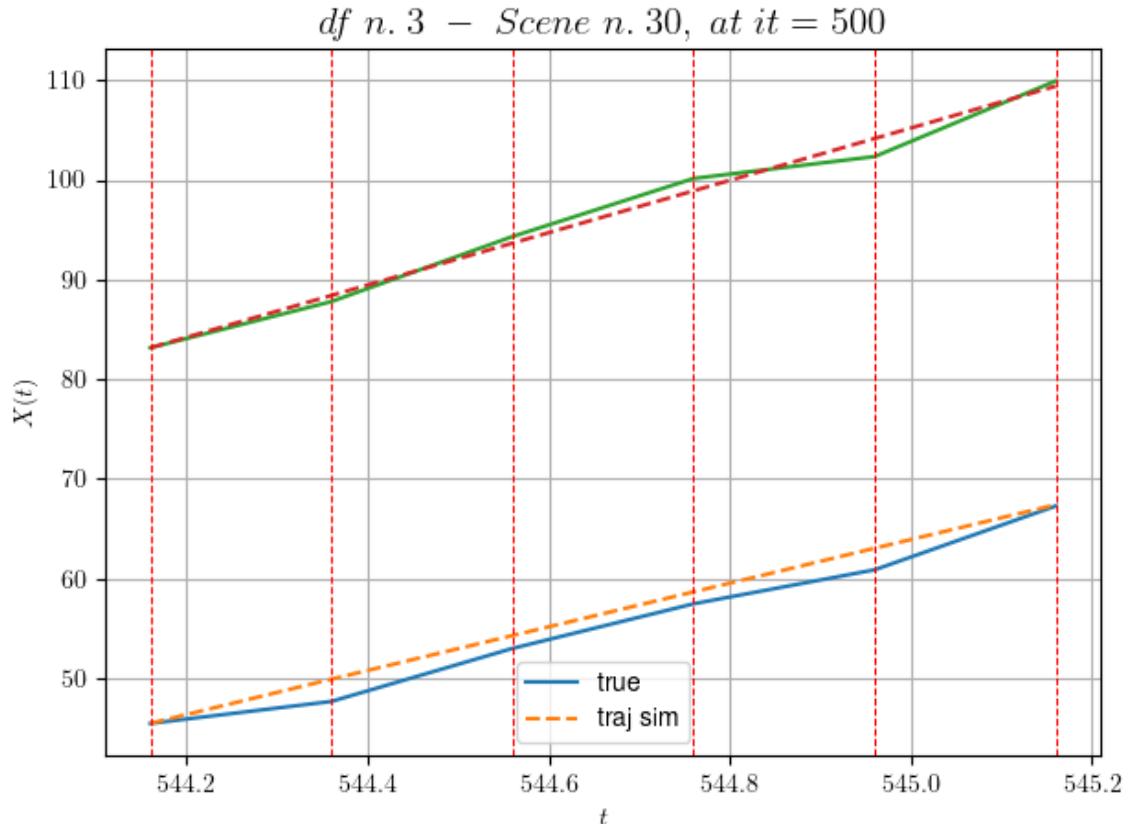


For scene 46/60:

* After LR finder: LR_NN=0.0005 with mse=44.50965368679661
at it=24
* v0 = 27.016664353697188
* MSE = 1.8206638238642785
* iterations = 500

DataFrame n.3. Scene n.47/60

We have 5 time intervals inside [544.16,545.16]

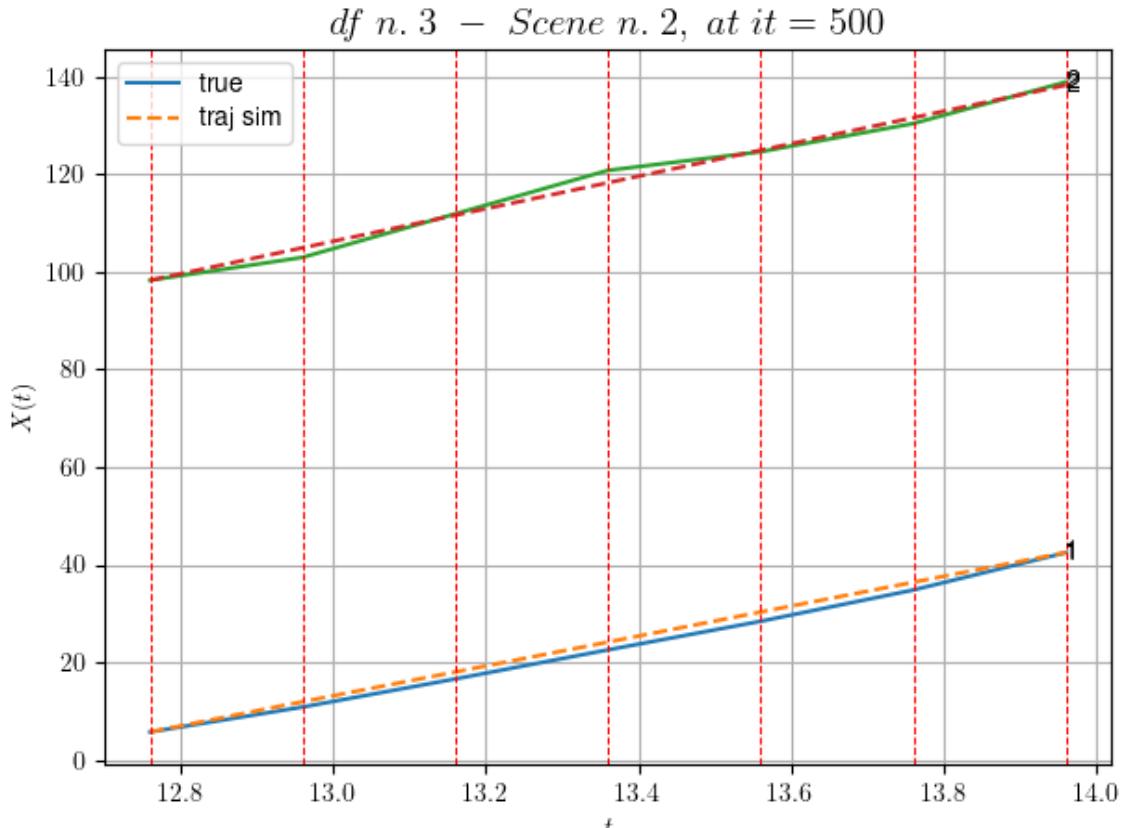


For scene 47/60:

* After LR finder: LR_NN=1e-05 with mse=3.9197350686280075
at it=24
* v0 = 26.245021293270476
* MSE = 1.5517382392396482
* iterations = 500

DataFrame n.3. Scene n.48/60

We have 6 time intervals inside [12.76,13.96]

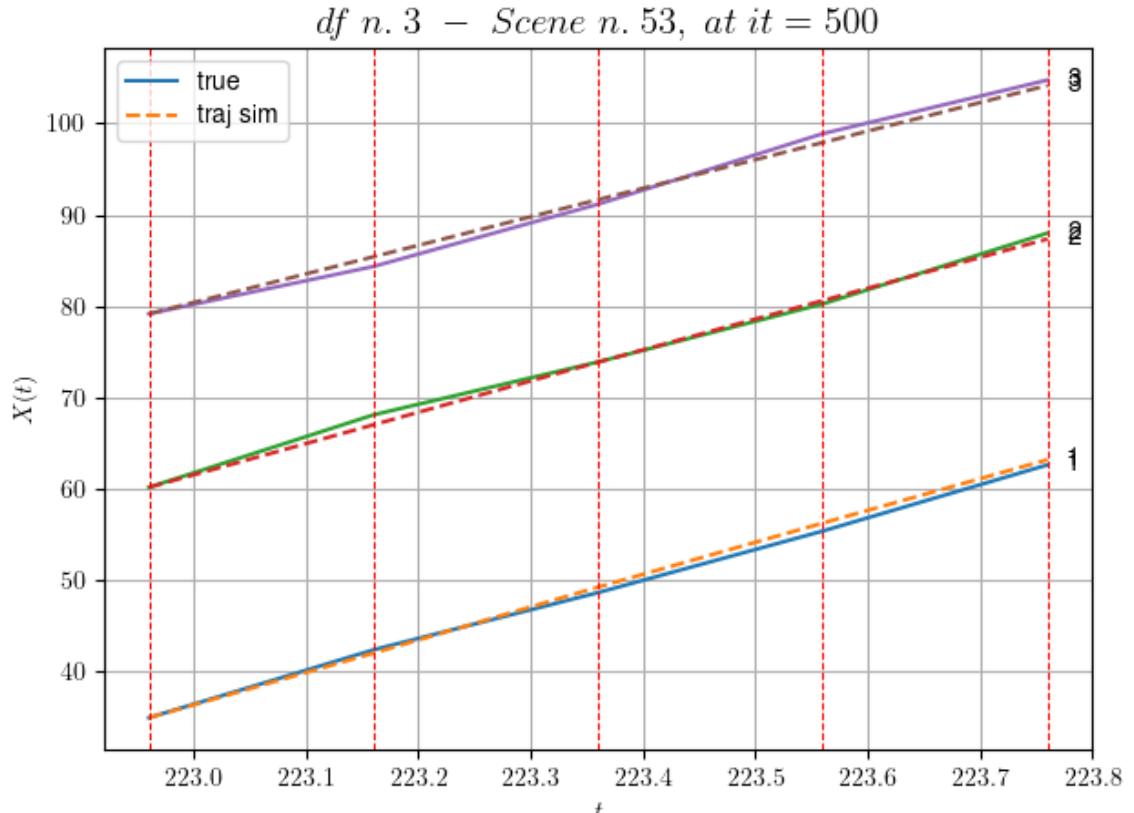


For scene 48/60:

* After LR finder: LR_NN=1e-05 with mse=4.801971830260401 at it=24
* v0 = 33.32970746415815
* MSE = 1.7304184480926195
* iterations = 500

DataFrame n.3. Scene n.49/60

We have 4 time intervals inside [222.96,223.76]

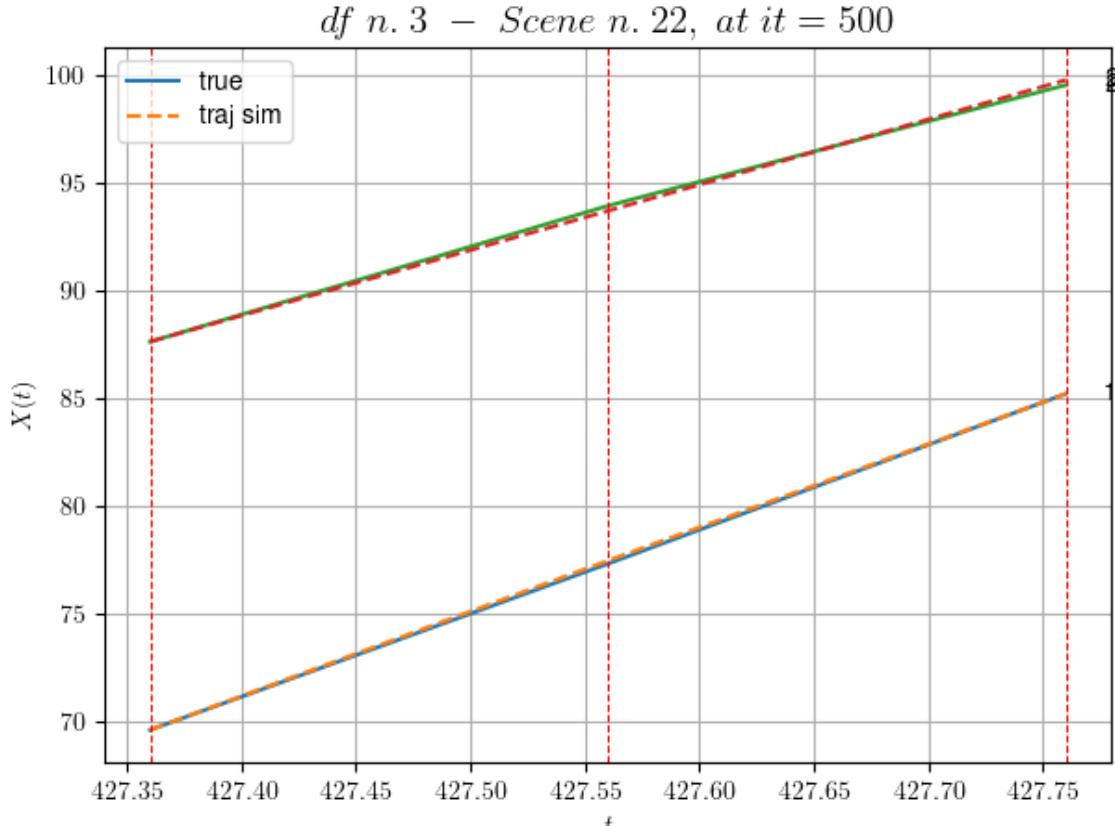


For scene 49/60:

* After LR finder: $LR_{NN}=0.0001$ with $mse=6.150292184121162$
at it=24
* $v_0 = 31.279750687417856$
* MSE = 0.39997357400571526
* iterations = 500

DataFrame n.3. Scene n.50/60

We have 2 time intervals inside [427.36, 427.76]

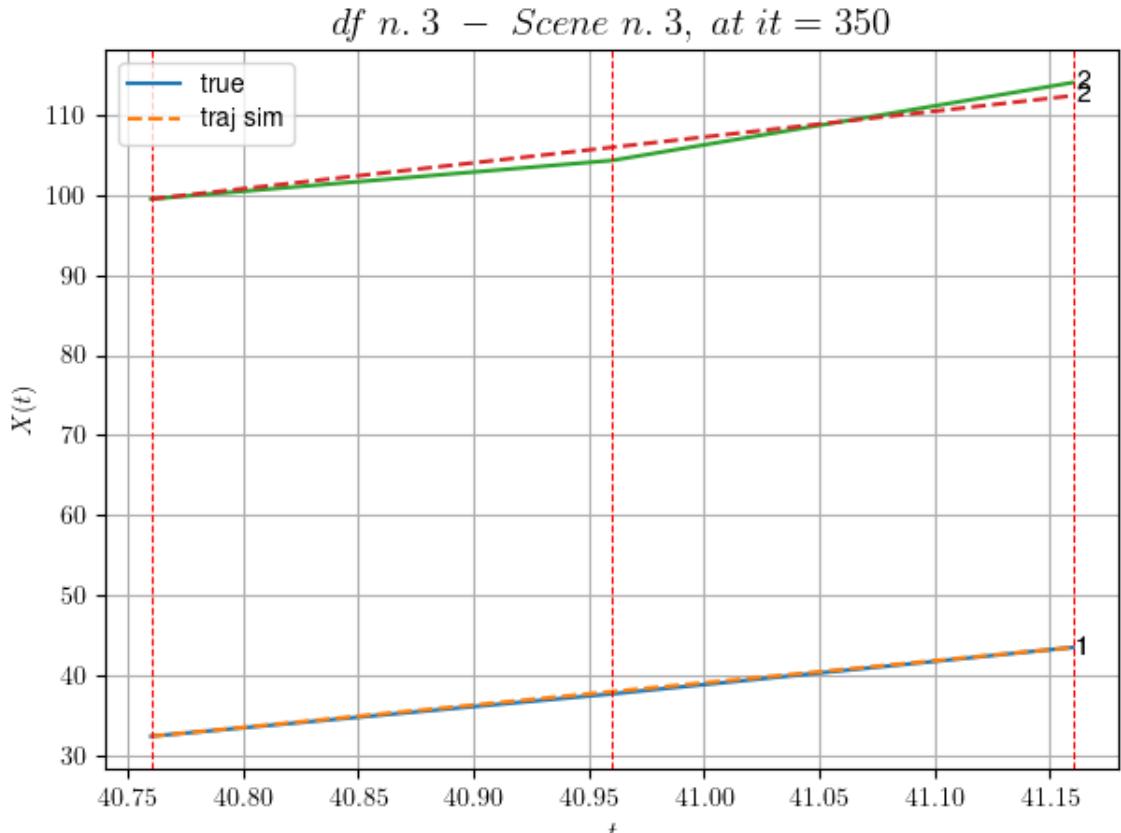


For scene 50/60:

* After LR finder: $\text{LR_NN}=0.0001$ with $\text{mse}=0.0503373500631075$
9 at it=24
* $v_0 = 30.361525596813422$
* $\text{MSE} = 0.019996764944175325$
* iterations = 500

DataFrame n.3. Scene n.51/60

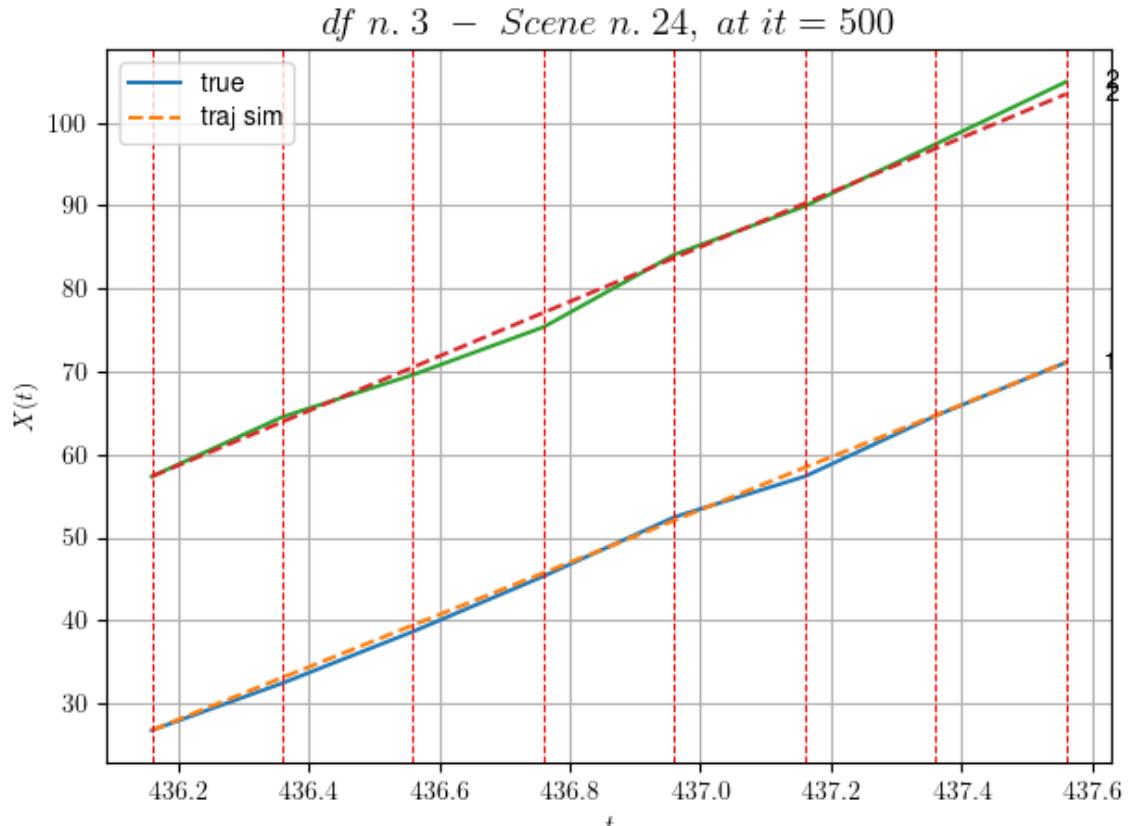
We have 2 time intervals inside [40.76,41.16]



For scene 51/60:
* After LR finder: LR_NN=1e-05 with mse=1.3167911707349111
at it=24
* v0 = 32.2068834772076
* MSE = 0.9107314736021849
* iterations = 350

DataFrame n.3. Scene n.52/60

We have 7 time intervals inside [436.16, 437.56]

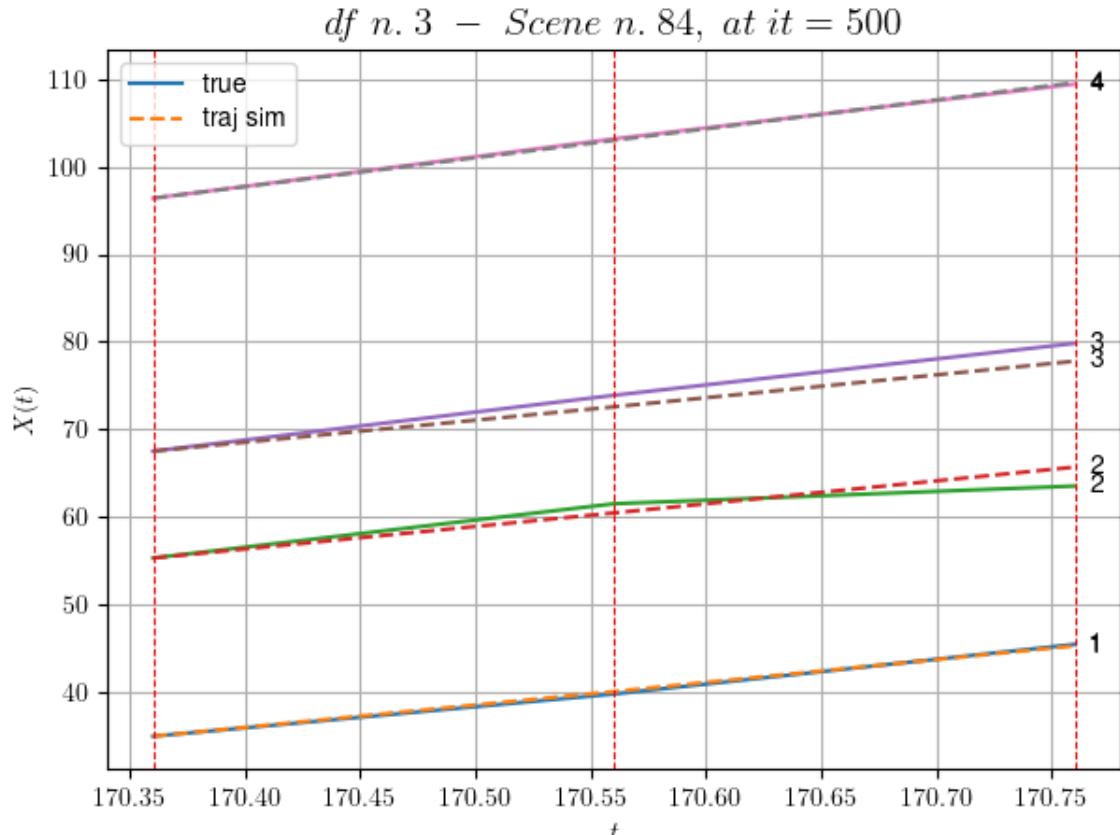


For scene 52/60:

* After LR finder: LR_NN=5e-05 with mse=4.069322179097068 at it=24
* v0 = 32.92393930276388
* MSE = 0.5923005833457097
* iterations = 500

DataFrame n.3. Scene n.53/60

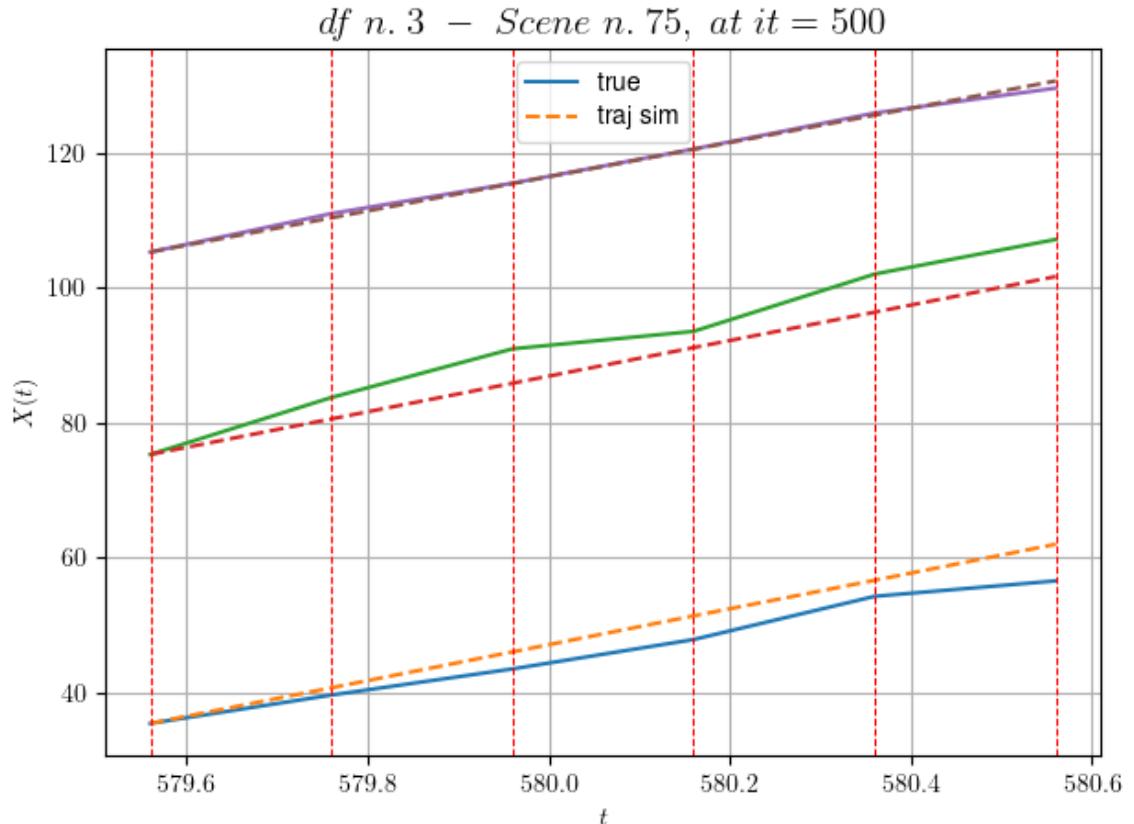
We have 2 time intervals inside [170.36,170.76]



For scene 53/60:
* After LR finder: LR_NN=0.0001 with mse=1.93500033682582 at it=24
* v0 = 32.99653993565715
* MSE = 0.9821346786247196
* iterations = 500

DataFrame n.3. Scene n.54/60

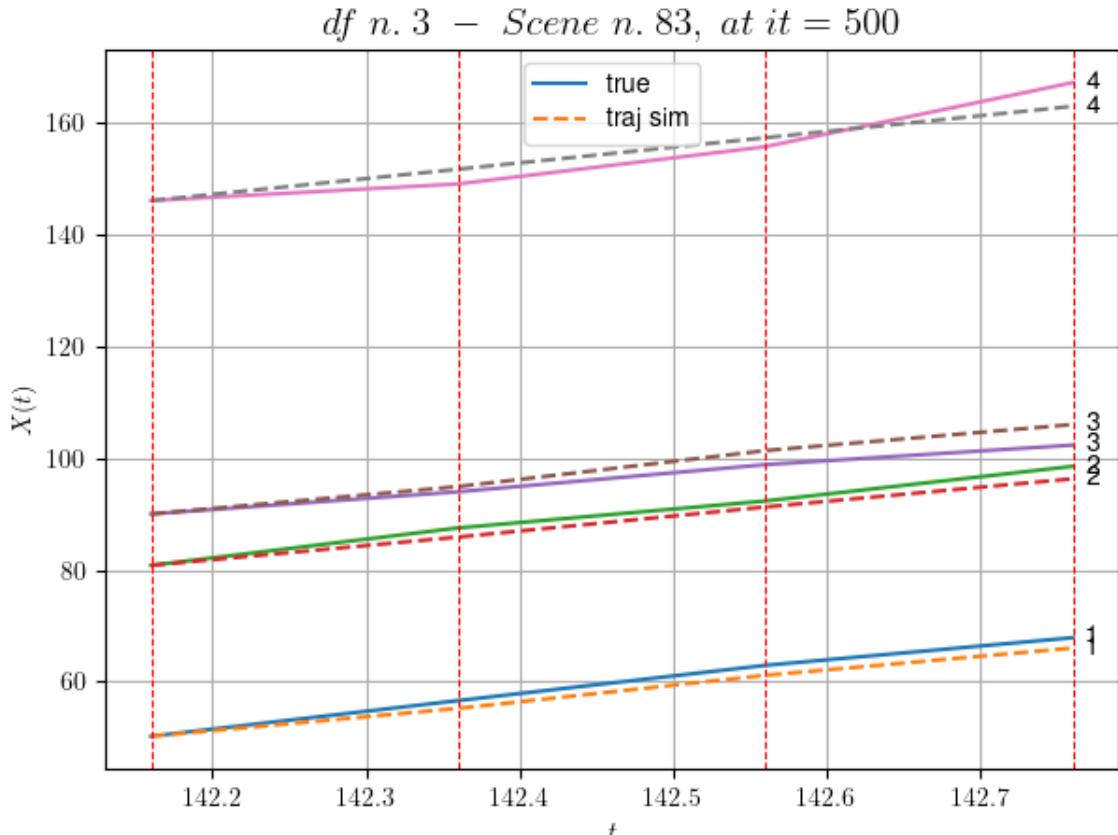
We have 5 time intervals inside [579.56,580.56]



For scene 54/60:
* After LR finder: LR_NN=1e-05 with mse=37.548154597246395
at it=24
* v0 = 25.358404463470468
* MSE = 8.92110904838279
* iterations = 500

DataFrame n.3. Scene n.55/60

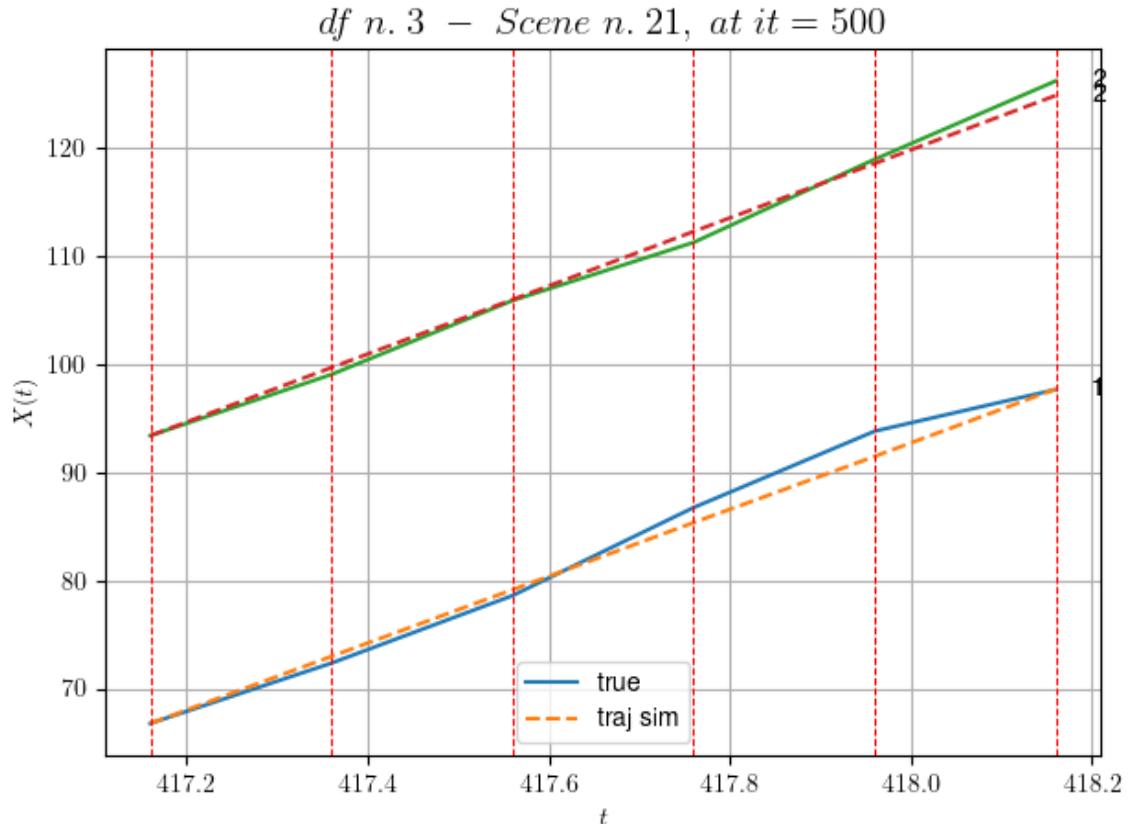
We have 3 time intervals inside [142.16,142.76]



For scene 55/60:
* After LR finder: LR_NN=0.0005 with mse=33.201965083617225
at it=24
* v0 = 28.121237748537865
* MSE = 3.706078150313941
* iterations = 500

DataFrame n.3. Scene n.56/60

We have 5 time intervals inside [417.16, 418.16]

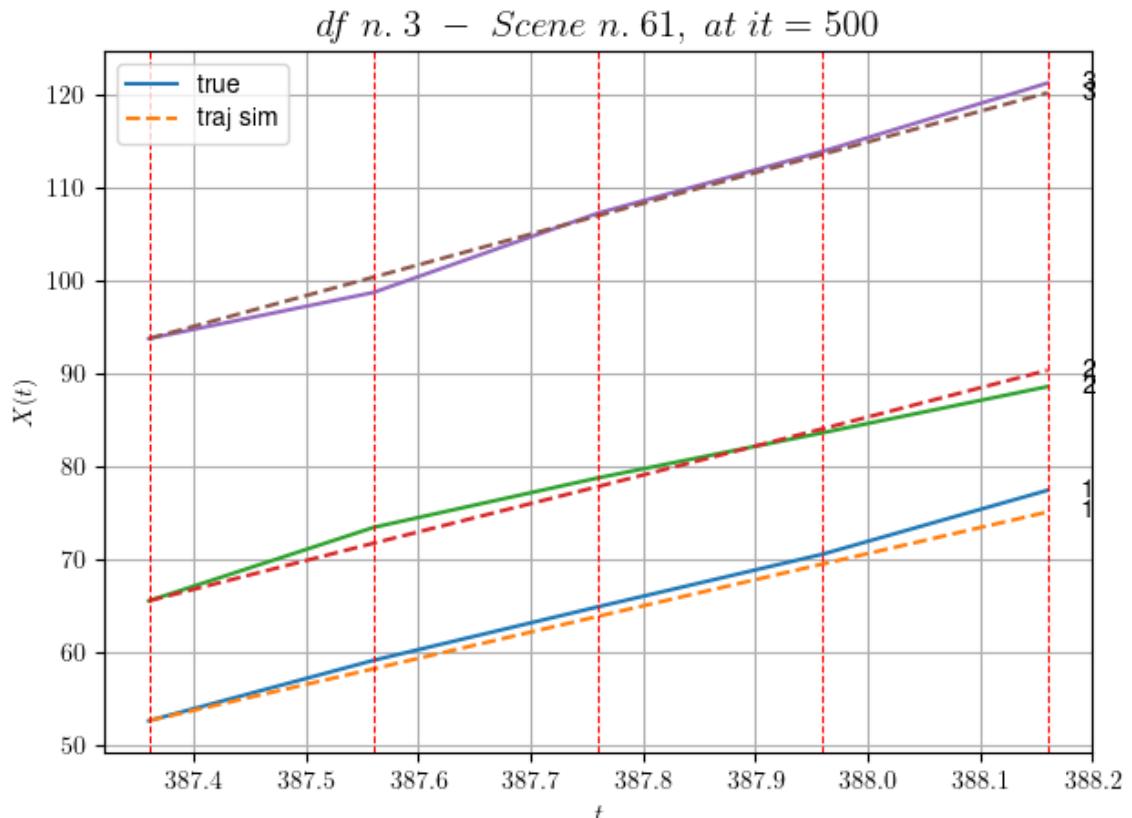


For scene 56/60:

* After LR finder: LR_NN=5e-05 with mse=1.556862593721405 at it=24
* v0 = 31.447990123716064
* MSE = 0.9323068627855203
* iterations = 500

DataFrame n.3. Scene n.57/60

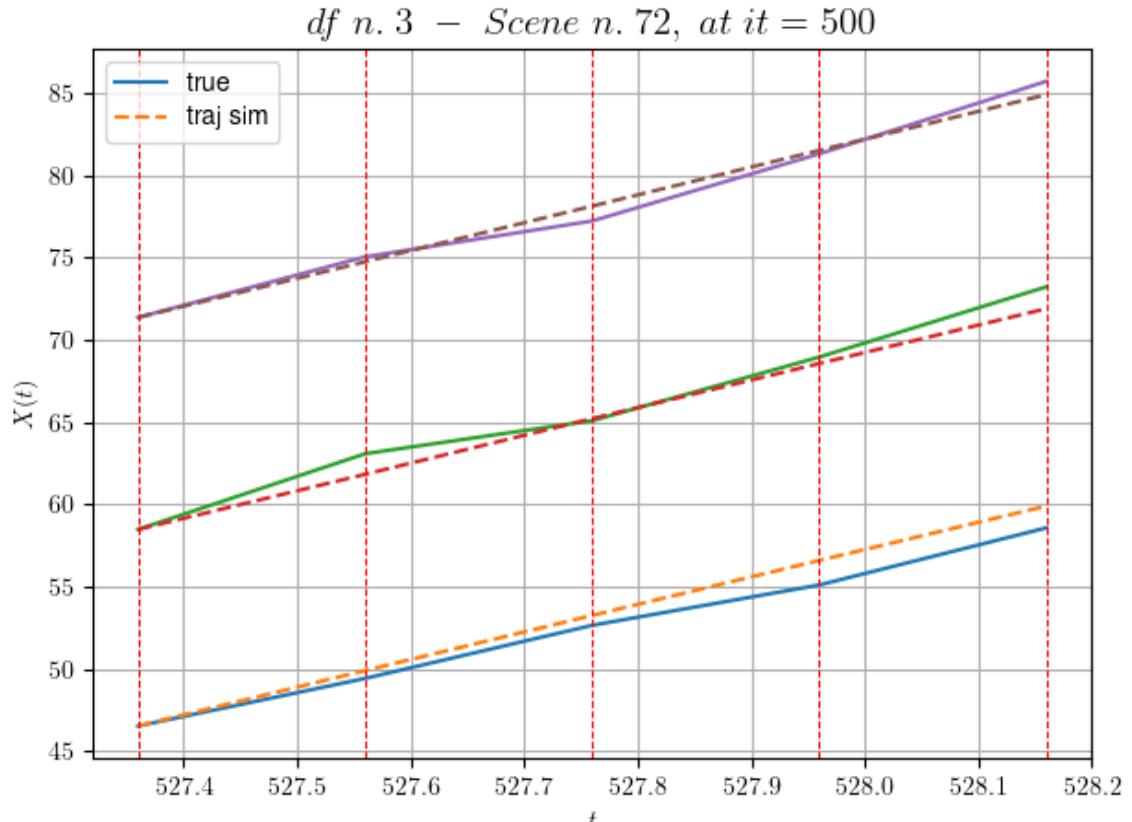
We have 4 time intervals inside [387.36,388.16]



For scene 57/60:
* After LR finder: $LR_NN=1e-05$ with $mse=15.48311055998577$
at it=24
* $v_0 = 33.03189808825602$
* MSE = 1.2974468752747847
* iterations = 500

DataFrame n.3. Scene n.58/60

We have 4 time intervals inside [527.36, 528.16]

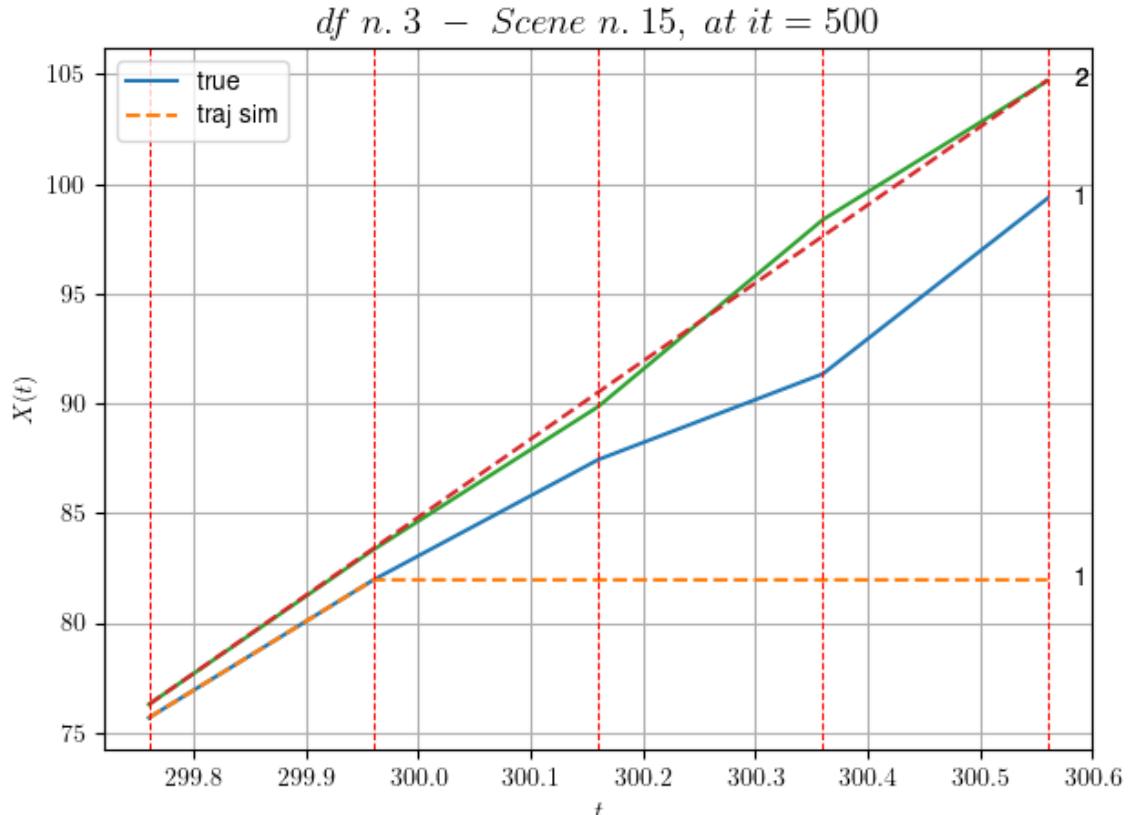


For scene 58/60:

* After LR finder: LR_NN=0.0001 with mse=14.090527055224427
at it=24
* v0 = 16.92090602277489
* MSE = 0.6440106218939476
* iterations = 500

DataFrame n.3. Scene n.59/60

We have 4 time intervals inside [299.76,300.56]

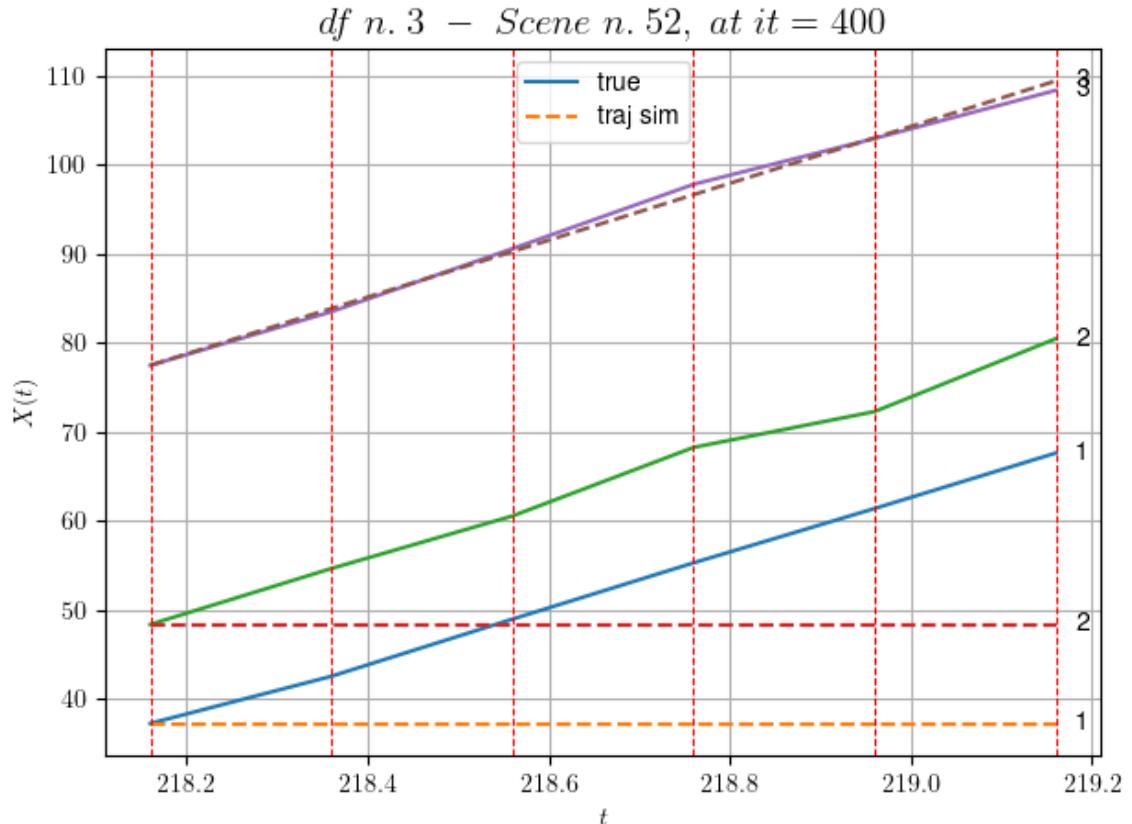


For scene 59/60:

- * After LR finder: $LR_{NN}=0.005$ with $mse=5.939582028156803$ at $it=24$
- * $v_0 = 35.55620181997074$
- * $MSE = 0.6812898722723467$
- * iterations = 500

DataFrame n.3. Scene n.60/60

We have 5 time intervals inside [218.16, 219.16]



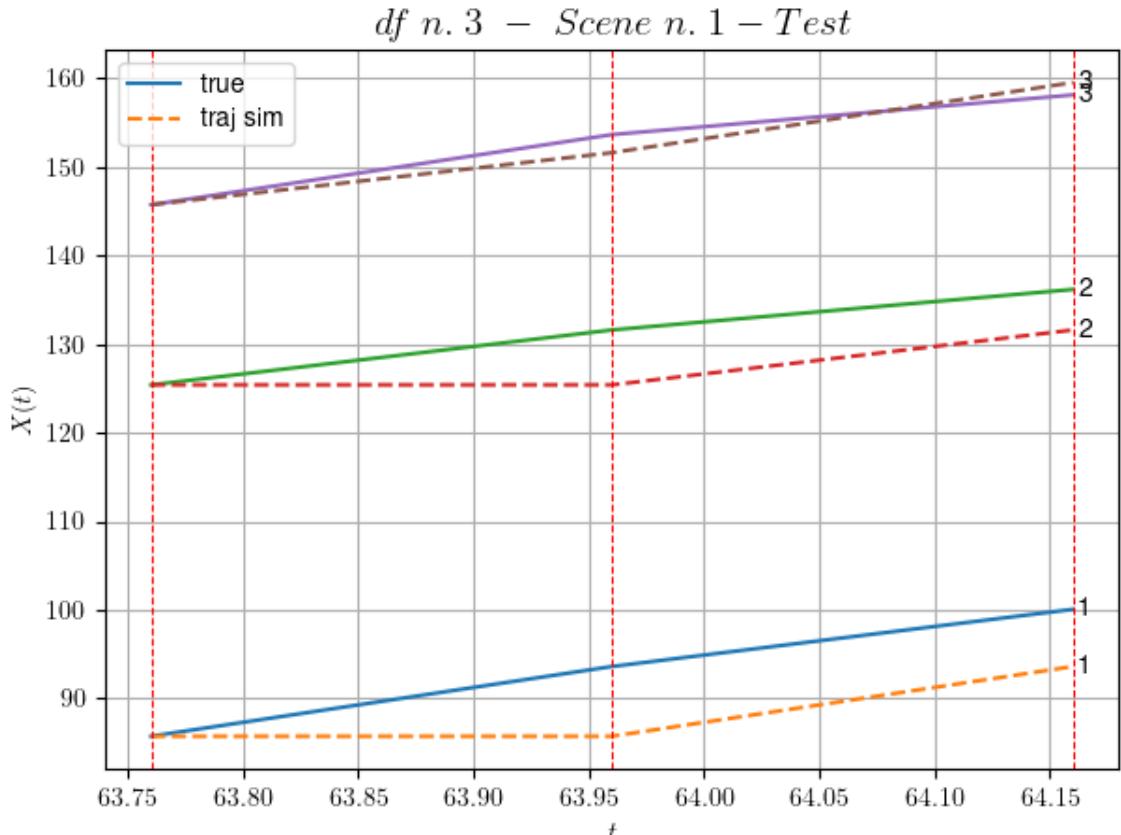
For scene 60/60:
* After LR finder: LR_NN=0.0005 with mse=28.73220046411353
at it=24
* v0 = 31.9469230720688
* MSE = 232.38264777312818
* iterations = 400

MSE train: 6.070890017905175

Testing step. (30 scenes)

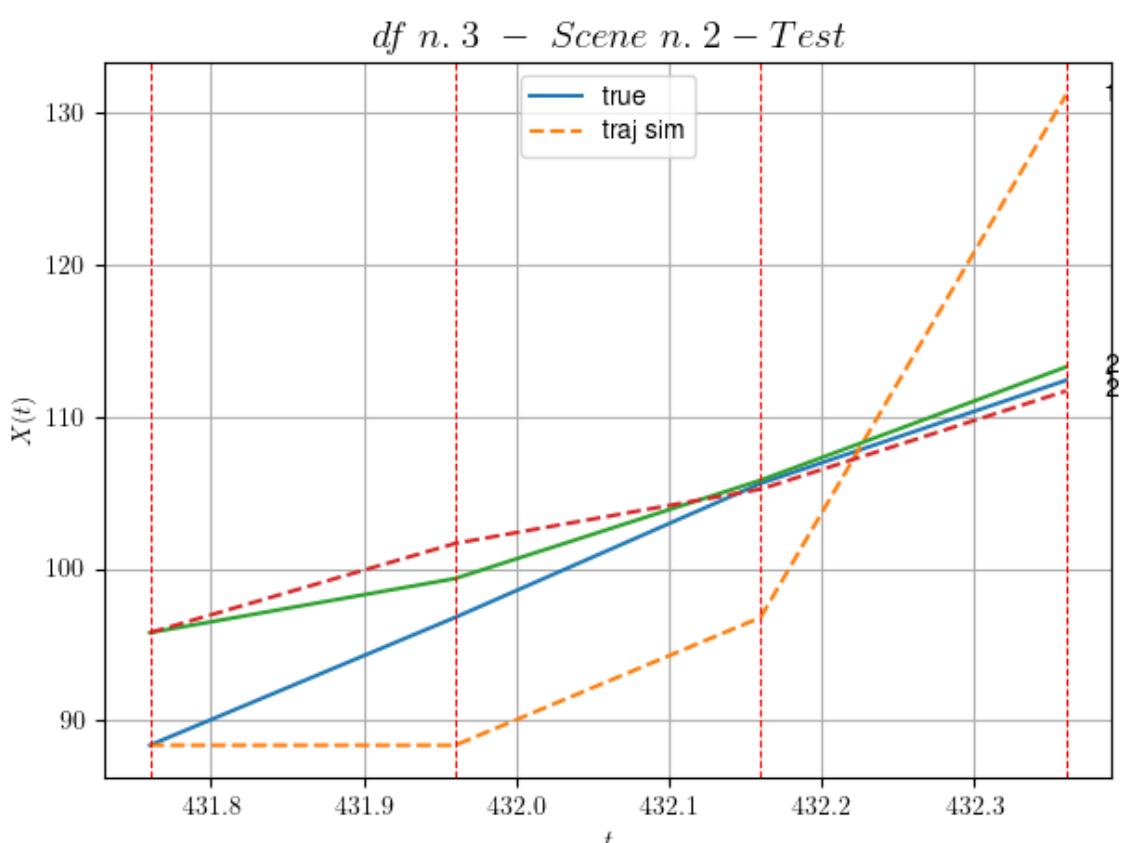
=====

DataFrame n.3. Scene n.1/30



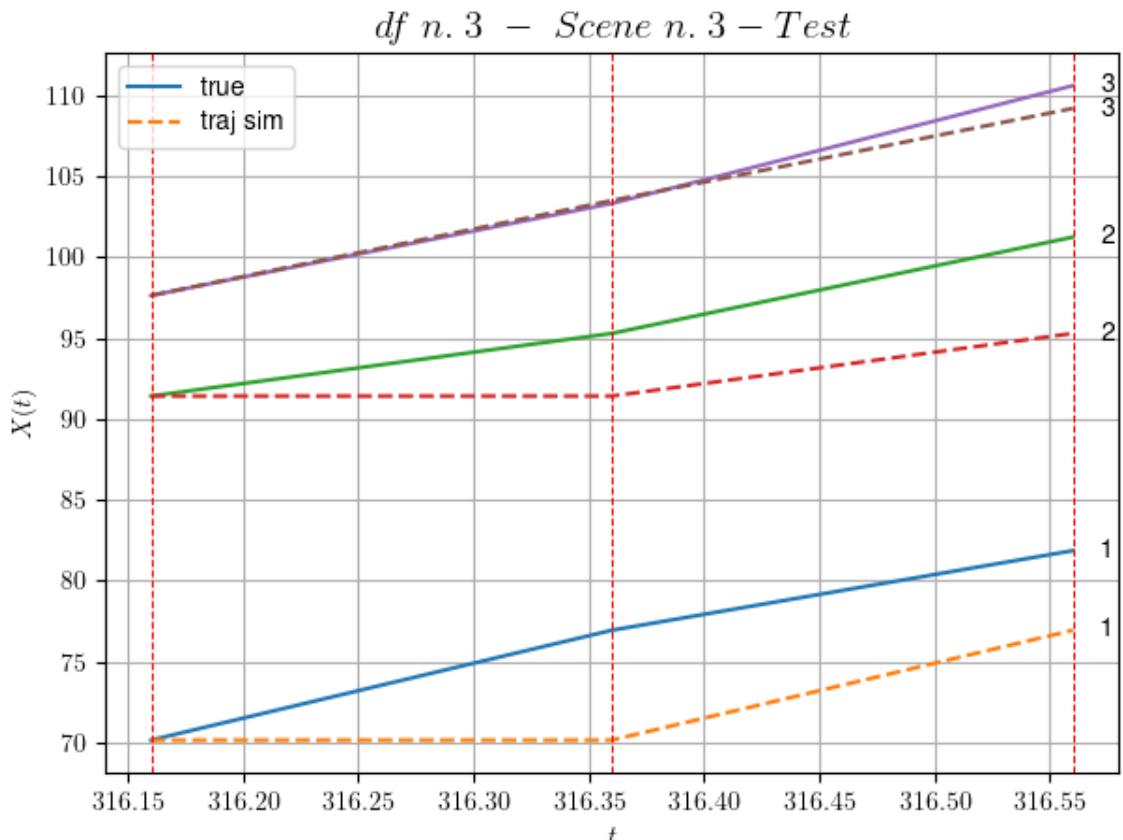
For scene 1/30:
* MSE = 18.757419813261002

DataFrame n.3. Scene n.2/30



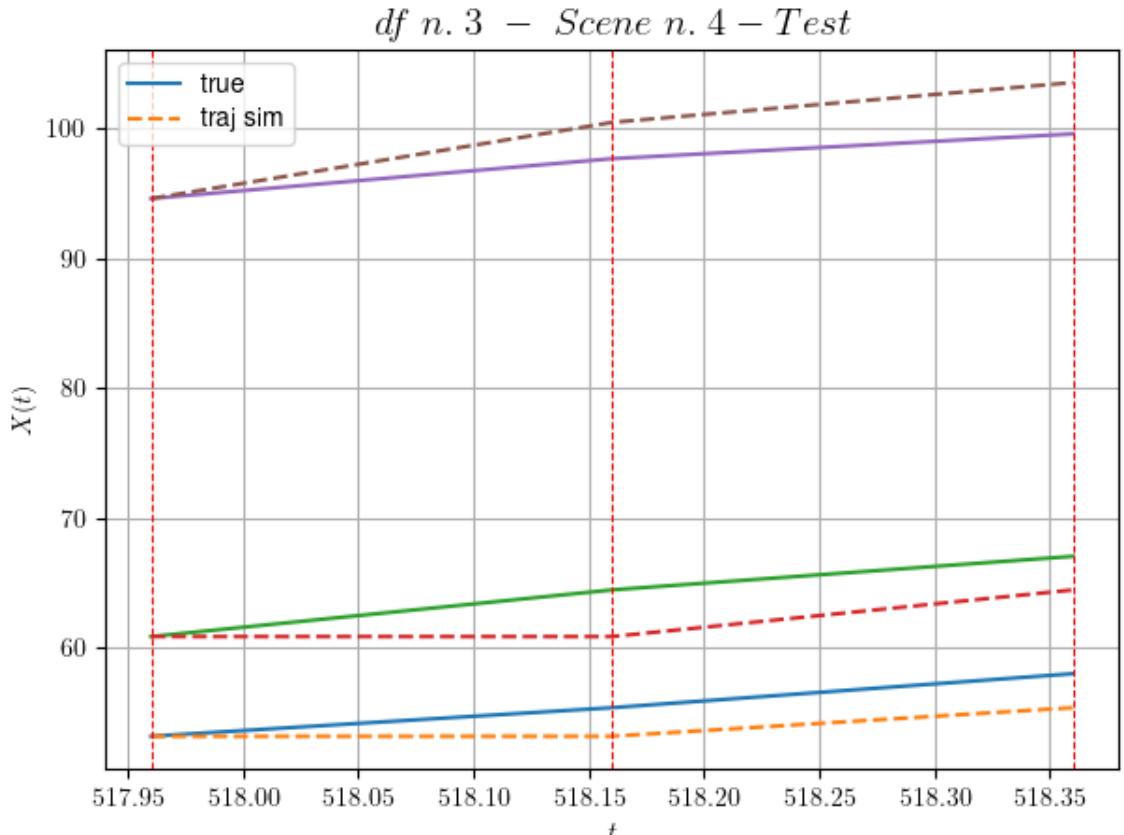
For scene 2/30:
* MSE = 63.618016279757406

DataFrame n.3. Scene n.3/30



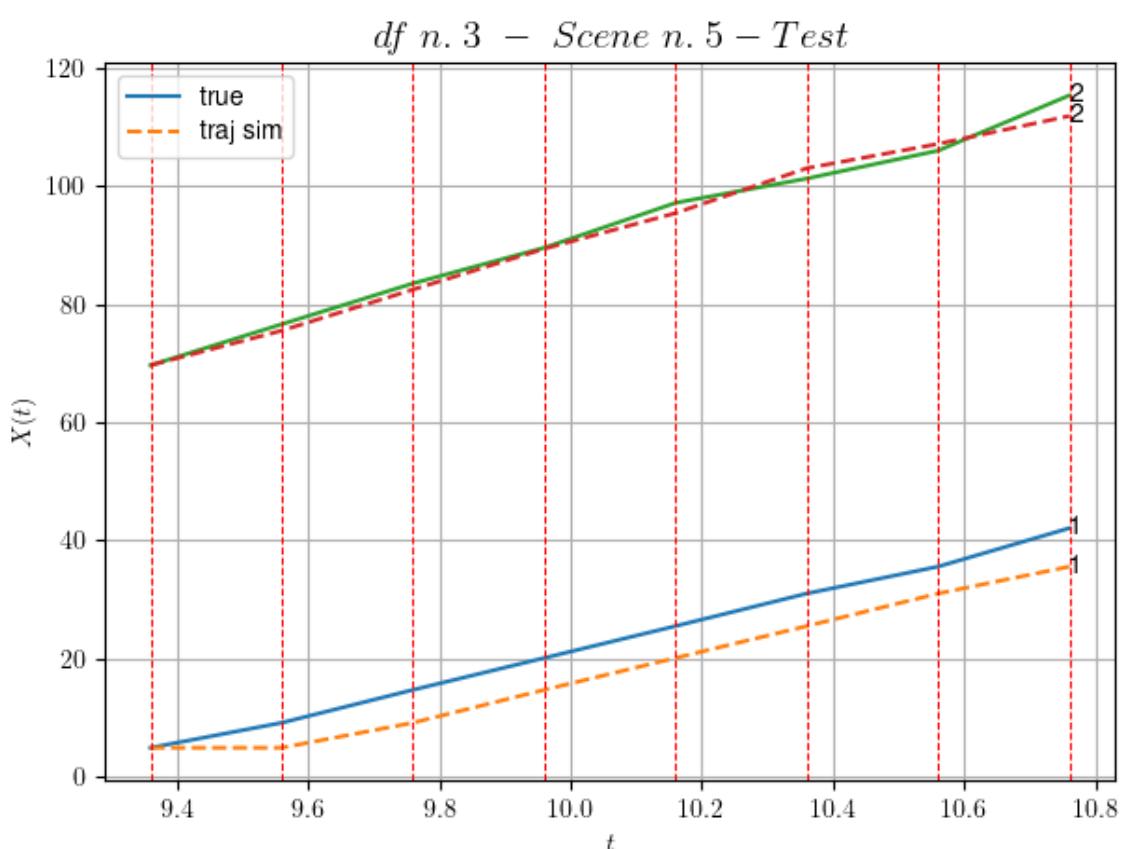
For scene 3/30:
* MSE = 13.644000375127996

DataFrame n.3. Scene n.4/30



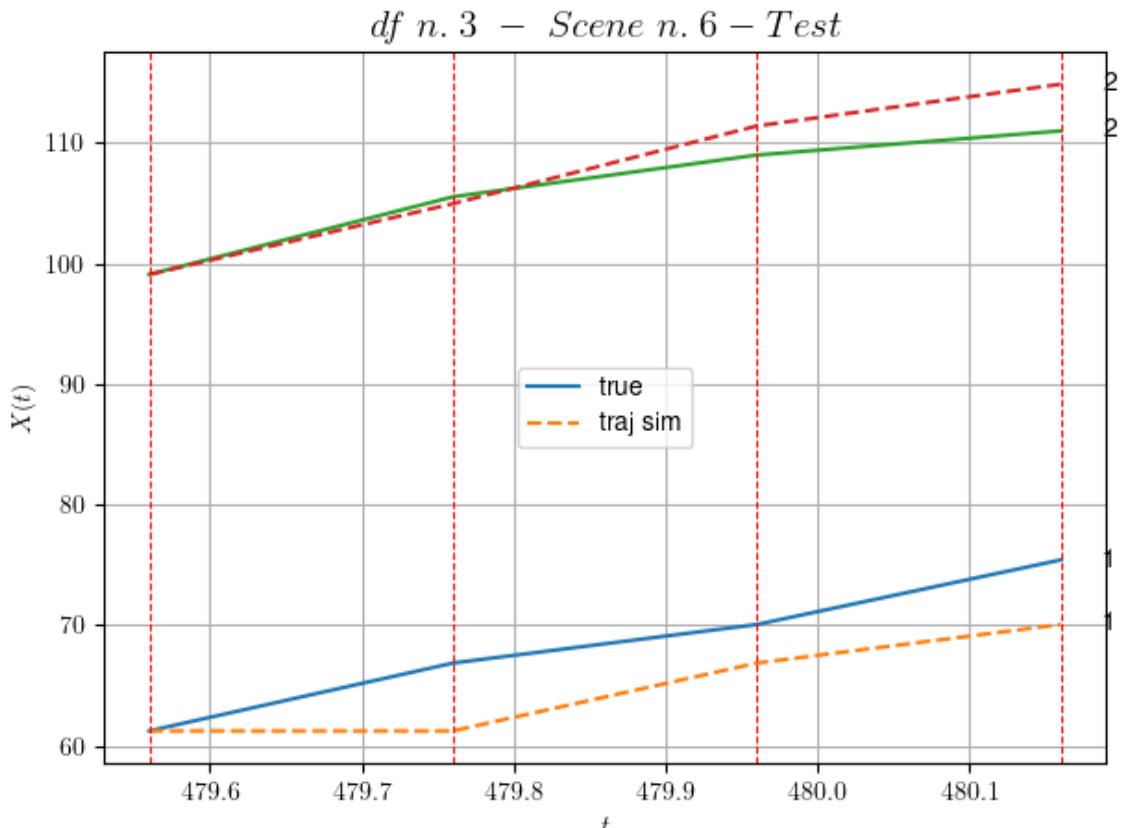
For scene 4/30:
* MSE = 6.099772508772658

DataFrame n.3. Scene n.5/30



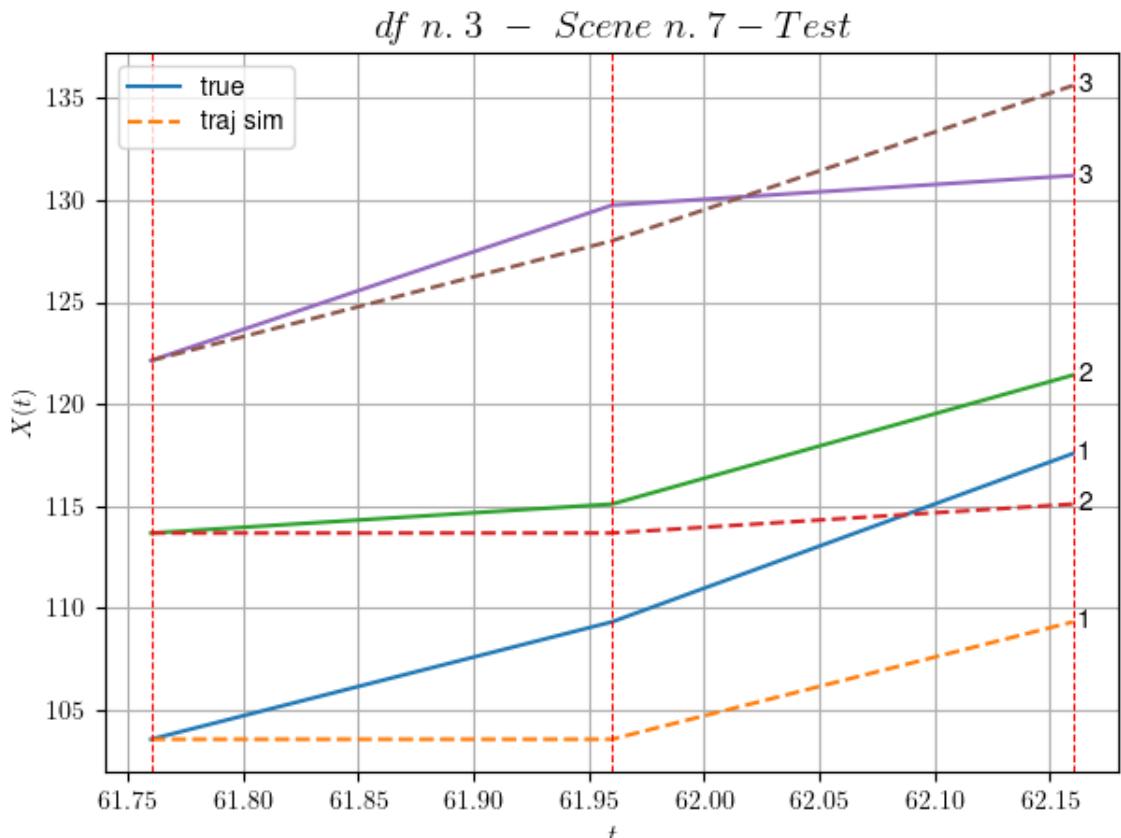
For scene 5/30:
* MSE = 13.967014475249409

DataFrame n.3. Scene n.6/30



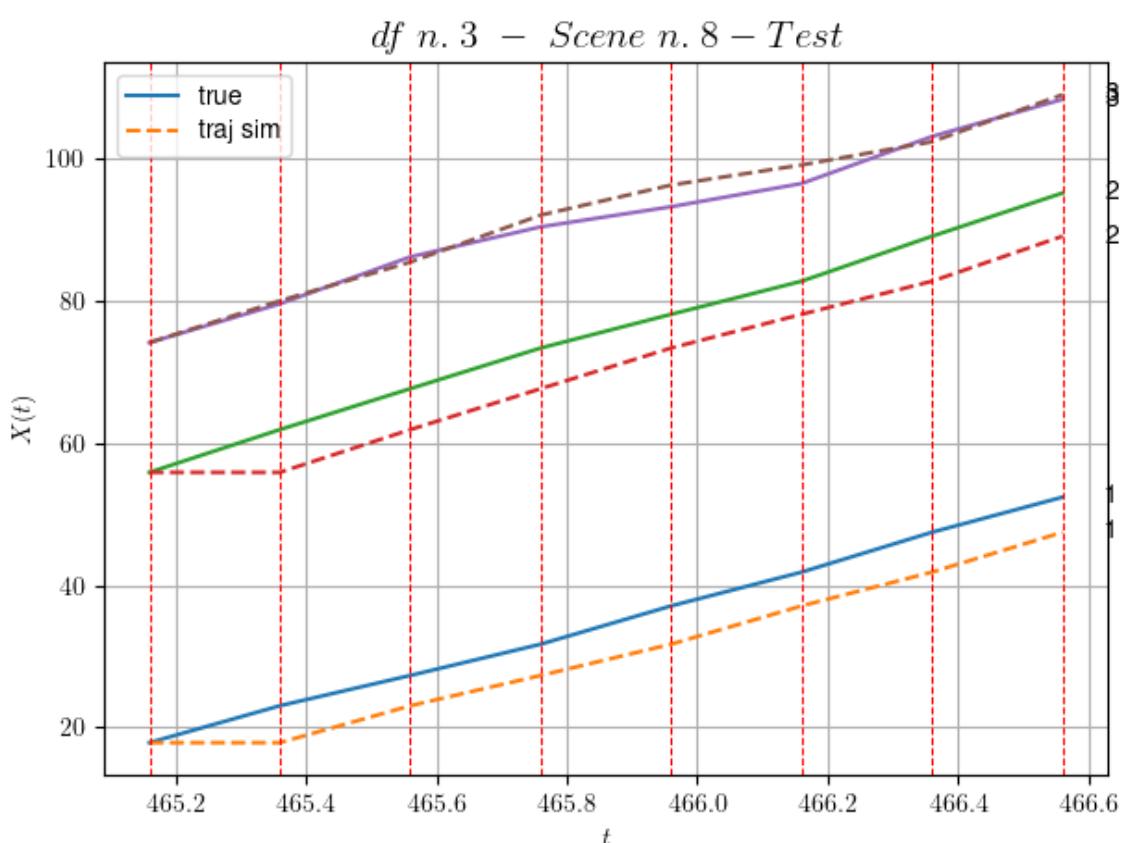
For scene 6/30:
* MSE = 11.466827114790787

DataFrame n.3. Scene n.7/30



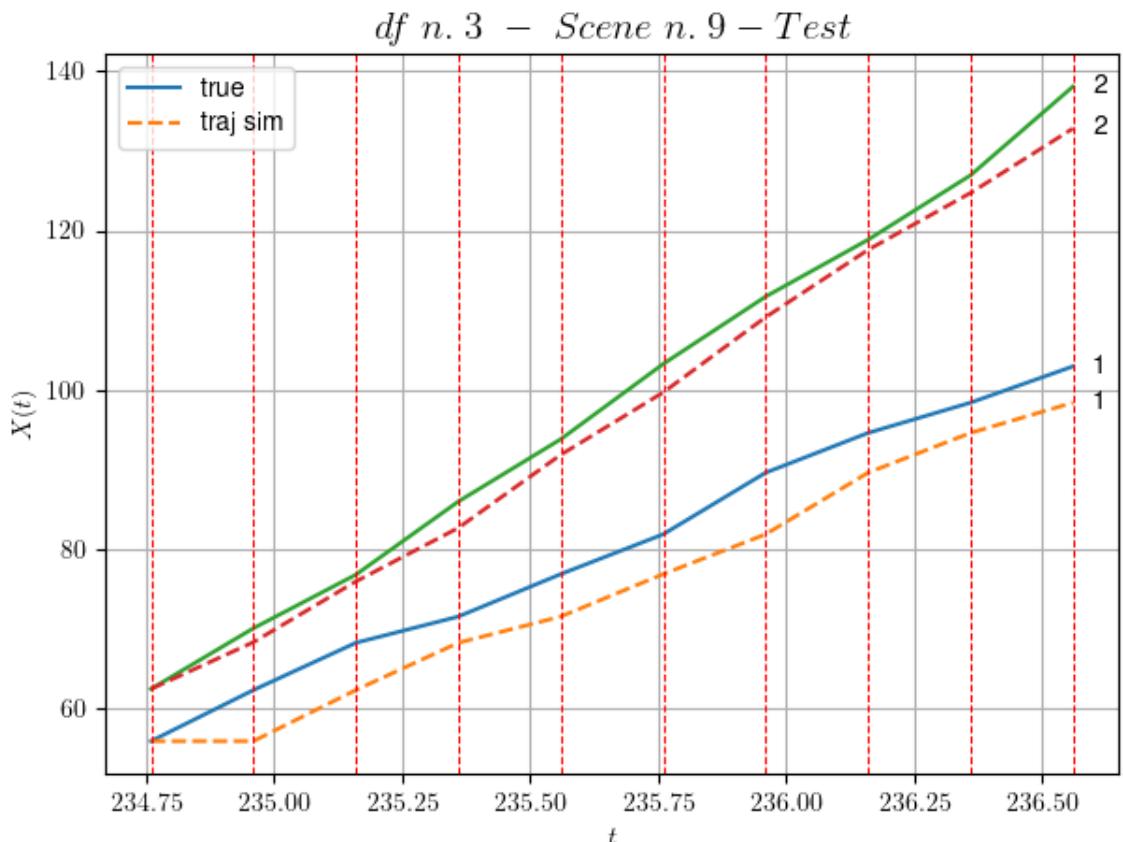
For scene 7/30:
* MSE = 18.448221360350747

DataFrame n.3. Scene n.8/30



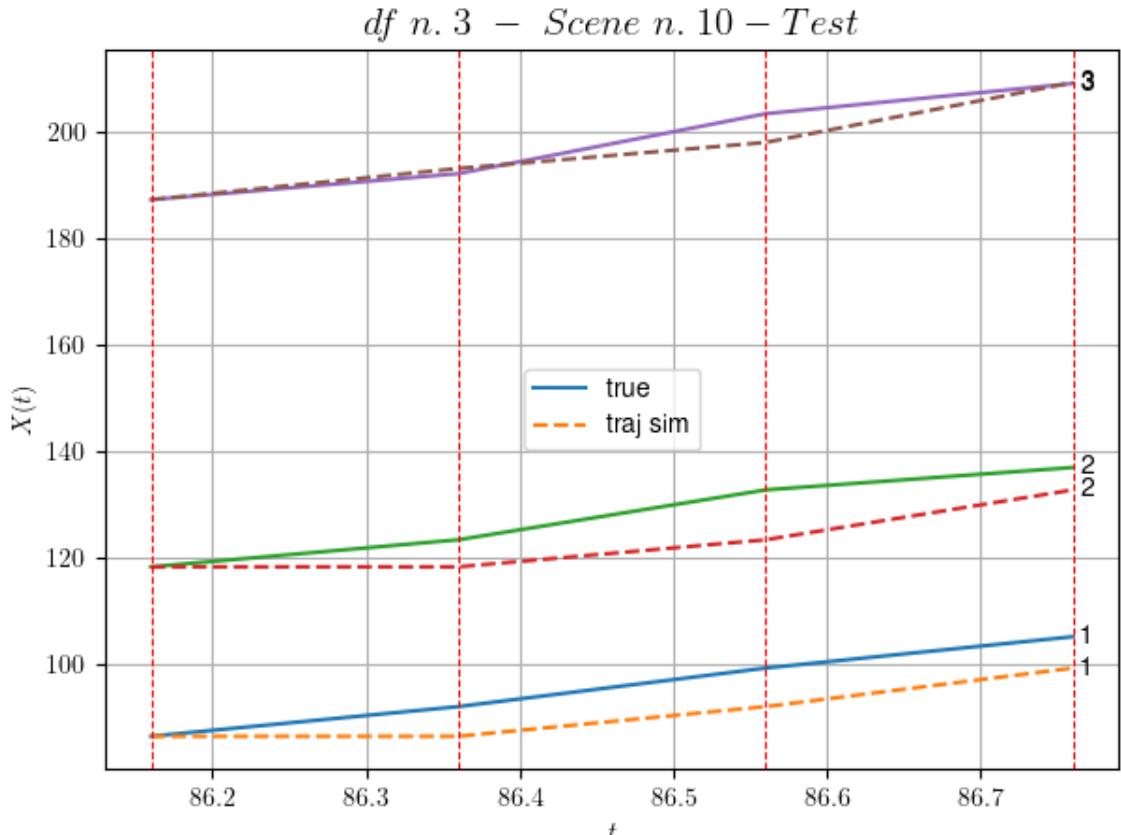
For scene 8/30:
* MSE = 17.297426296509617

DataFrame n.3. Scene n.9/30



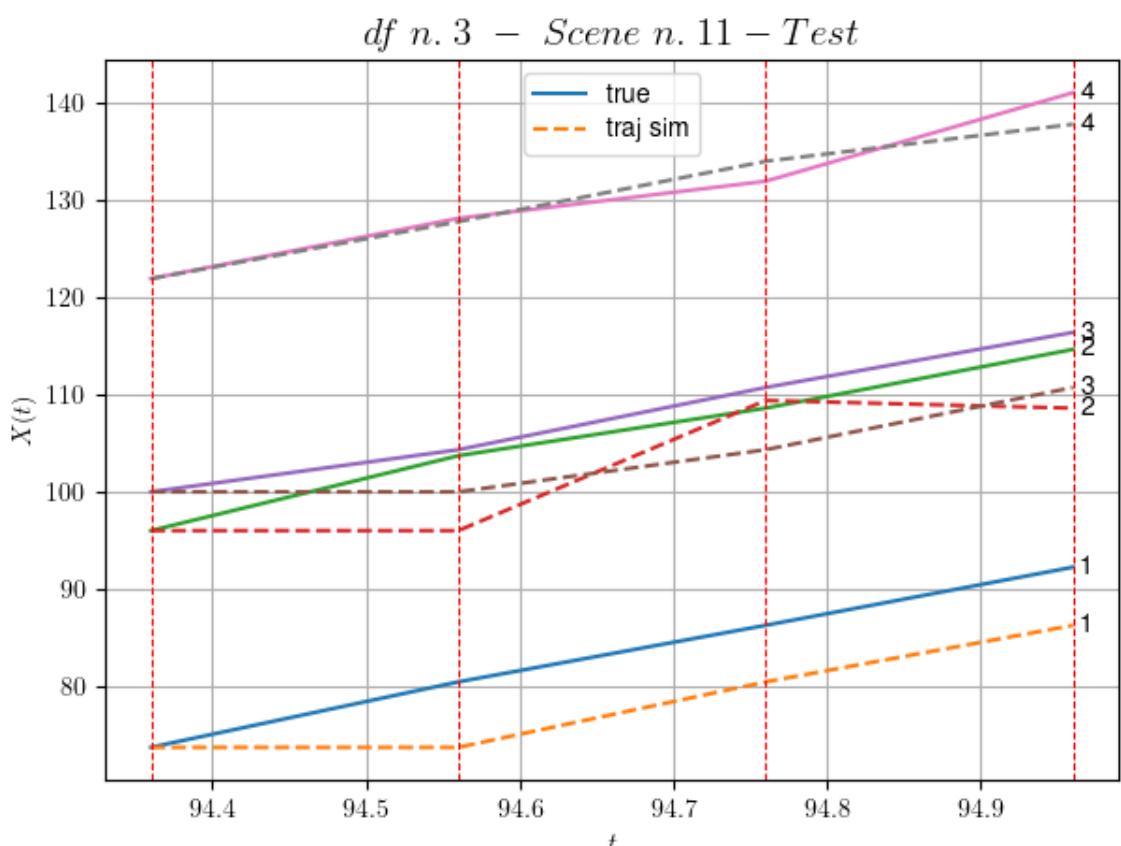
For scene 9/30:
* MSE = 16.62176352473682

DataFrame n.3. Scene n.10/30



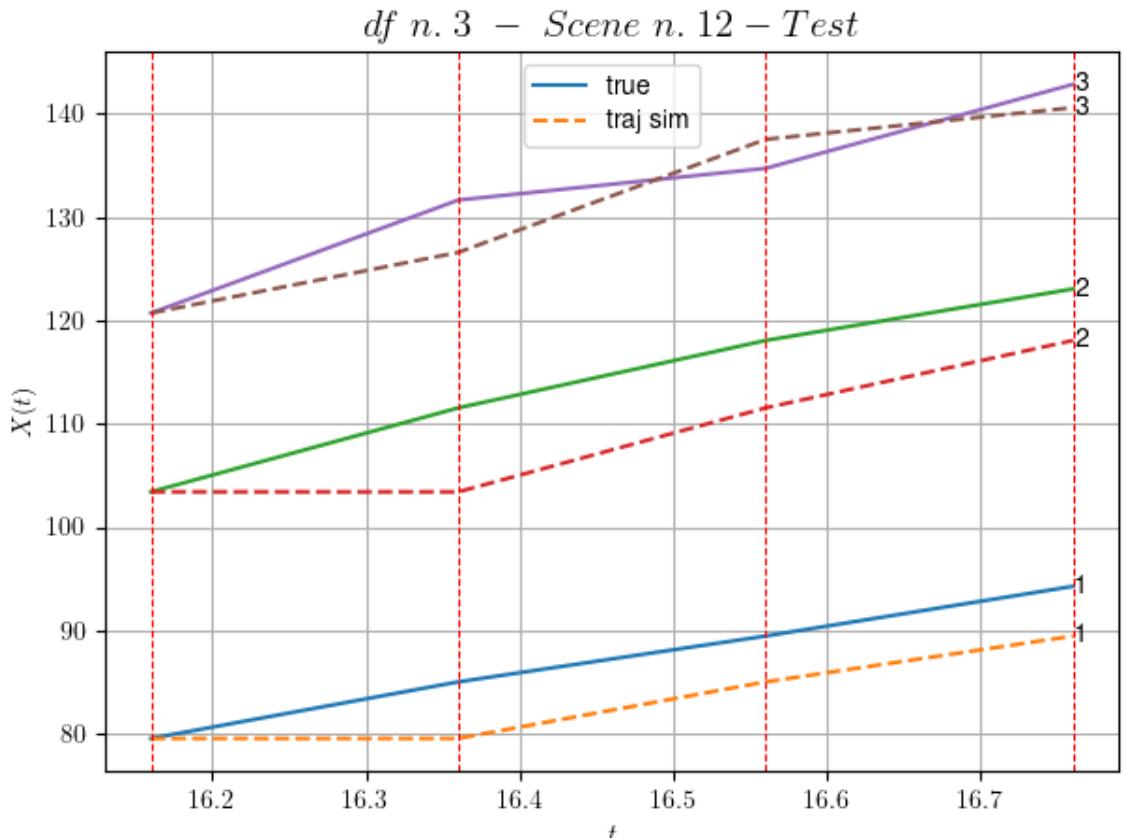
For scene 10/30:
* MSE = 23.369535084573226

DataFrame n.3. Scene n.11/30



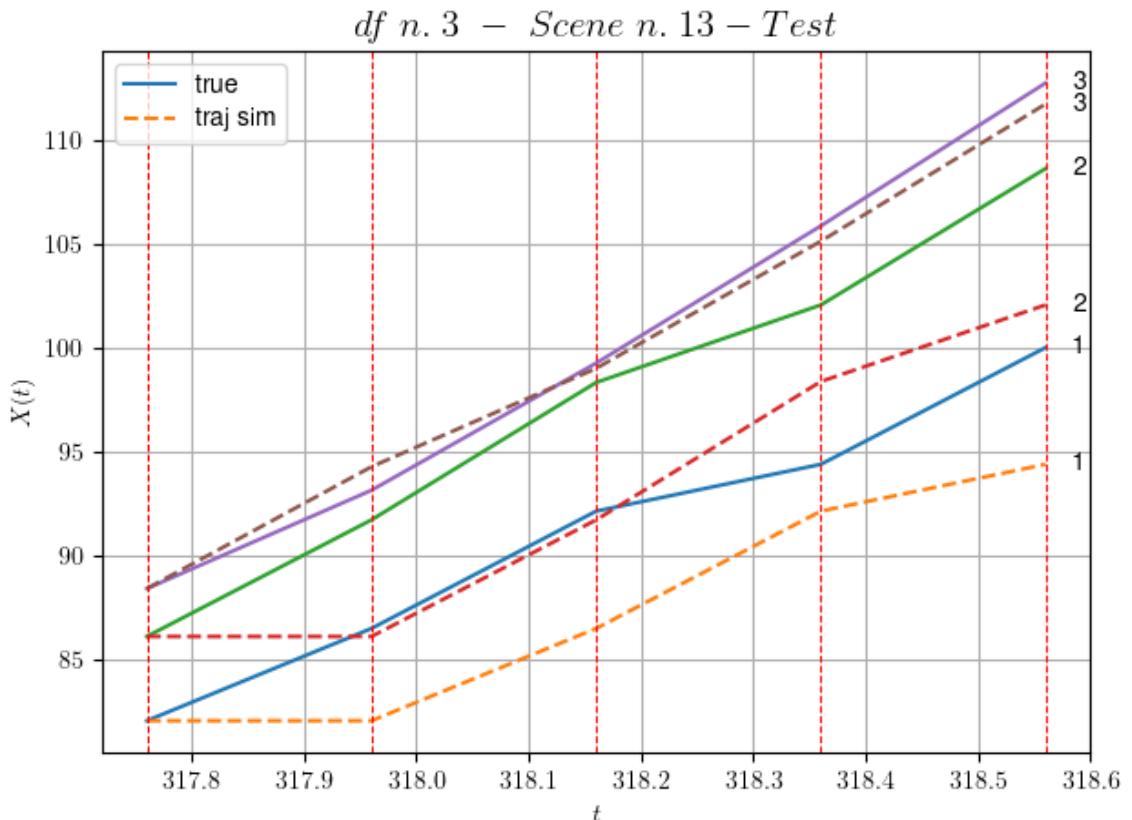
For scene 11/30:
* MSE = 19.95063457796765

DataFrame n.3. Scene n.12/30



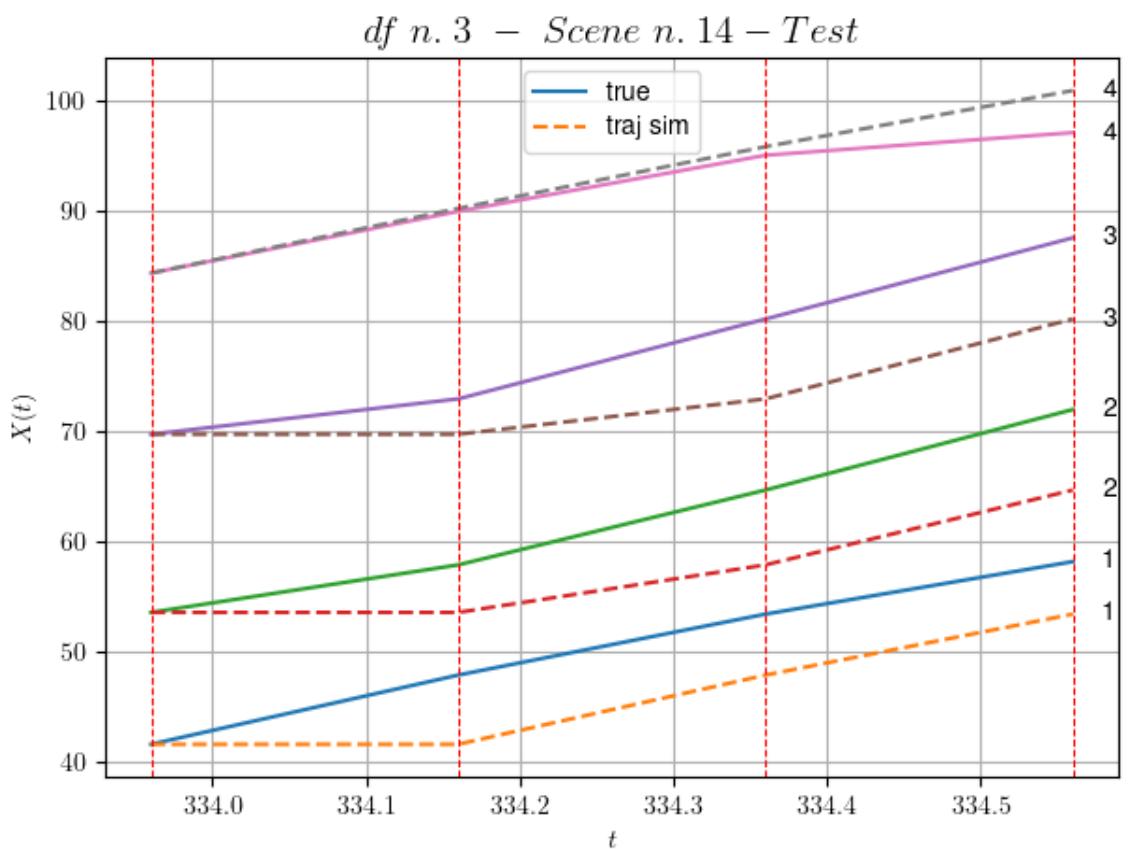
For scene 12/30:
* MSE = 20.389410973407546

DataFrame n.3. Scene n.13/30



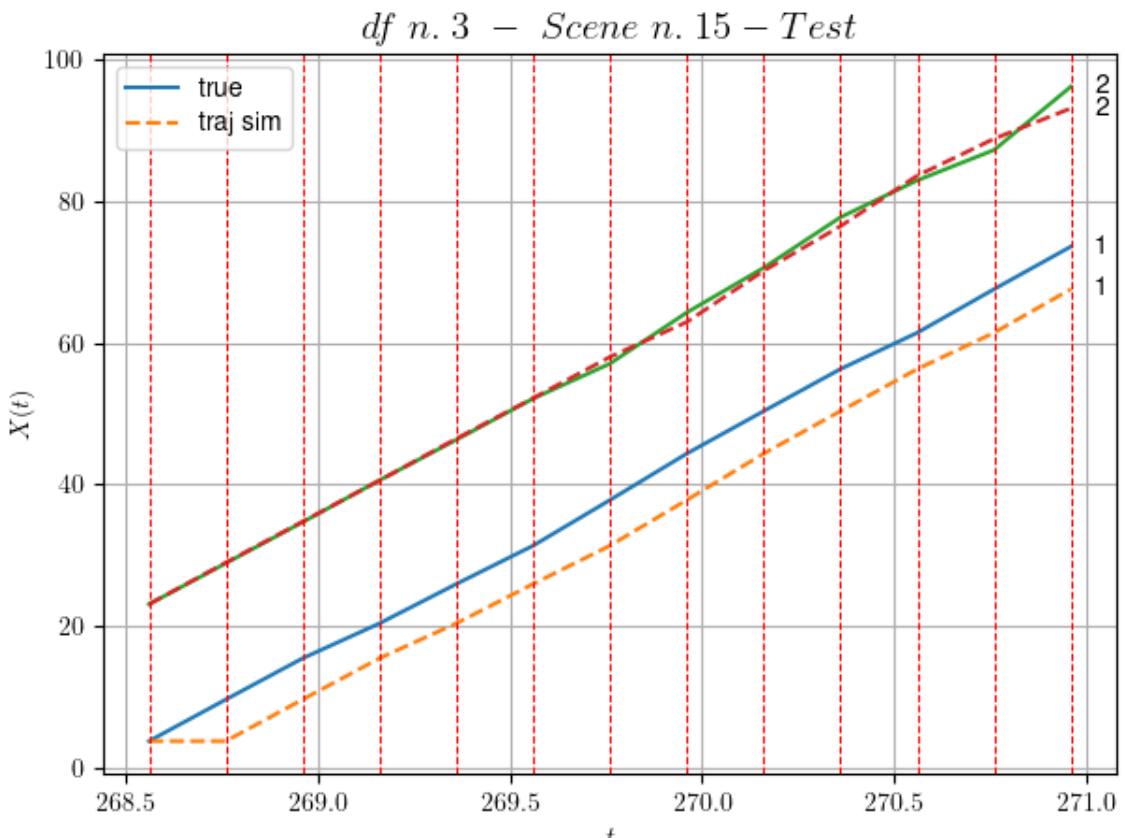
For scene 13/30:
 * MSE = 14.91026484309734

DataFrame n.3. Scene n.14/30



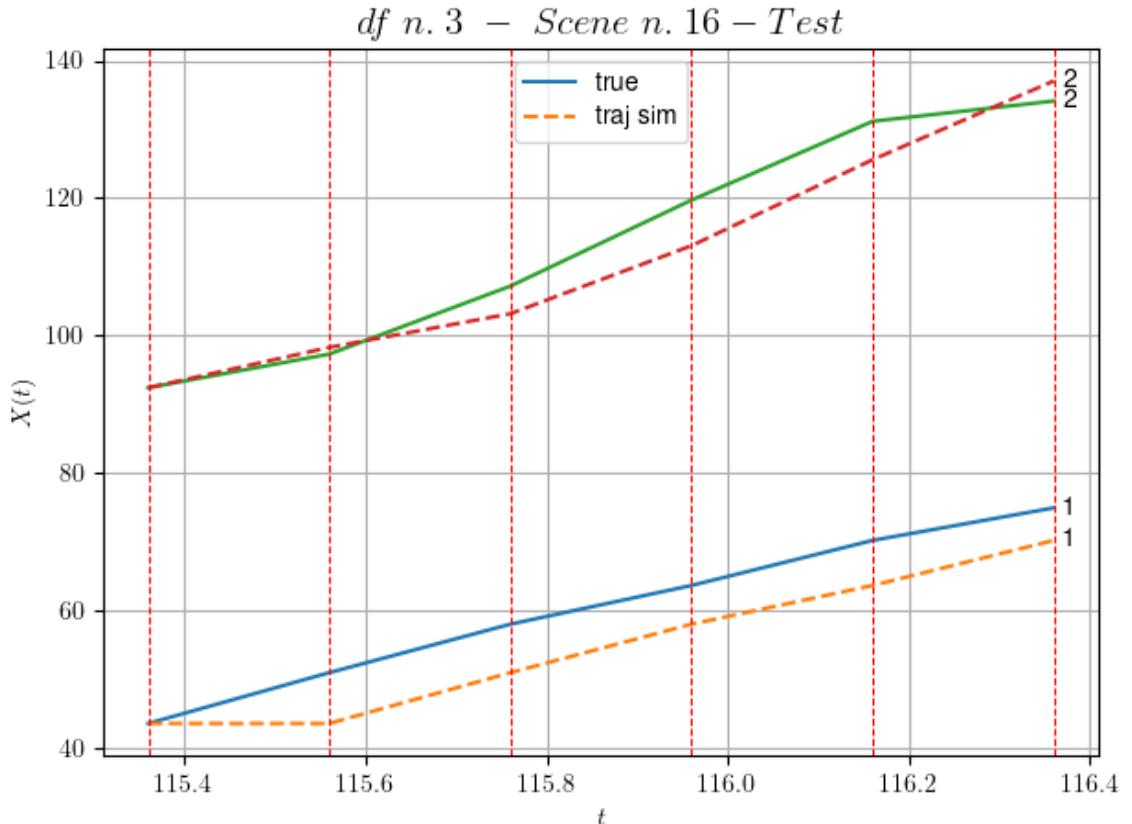
For scene 14/30:
* MSE = 21.462138904179685

DataFrame n.3. Scene n.15/30



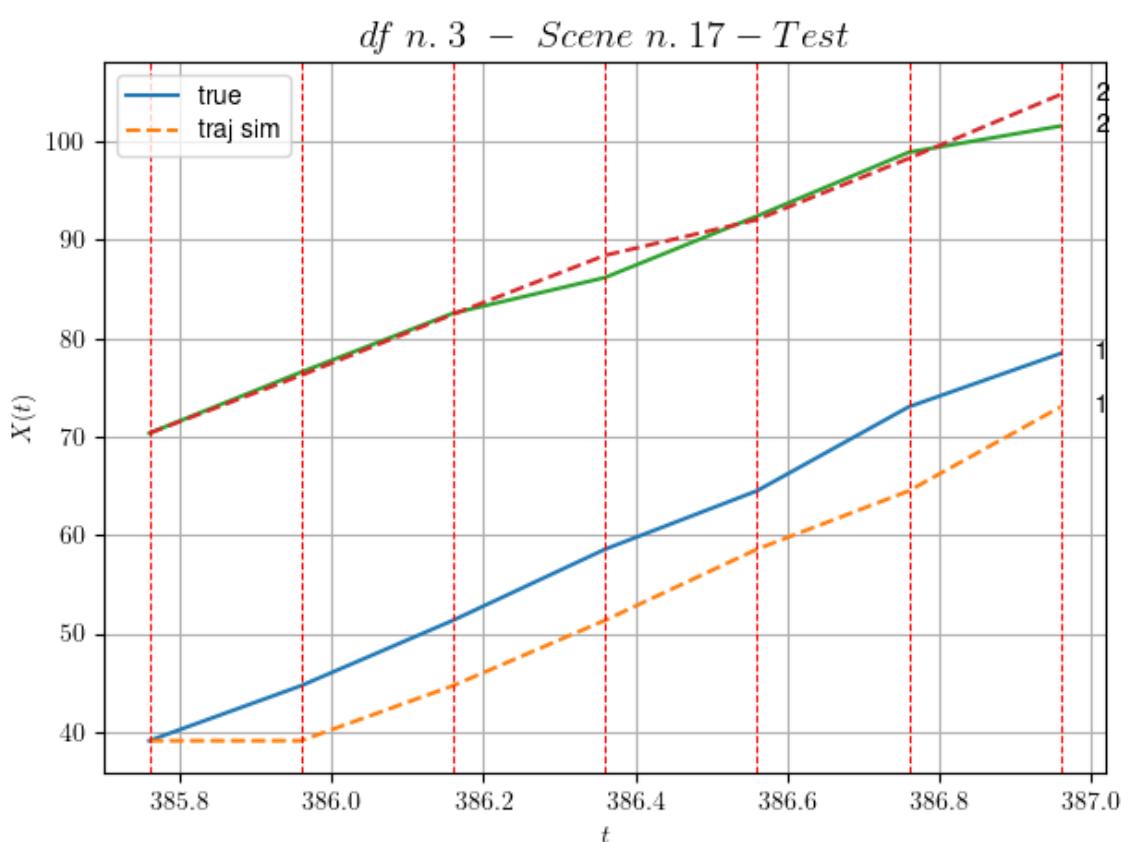
For scene 15/30:
* MSE = 16.36079731144446

DataFrame n.3. Scene n.16/30



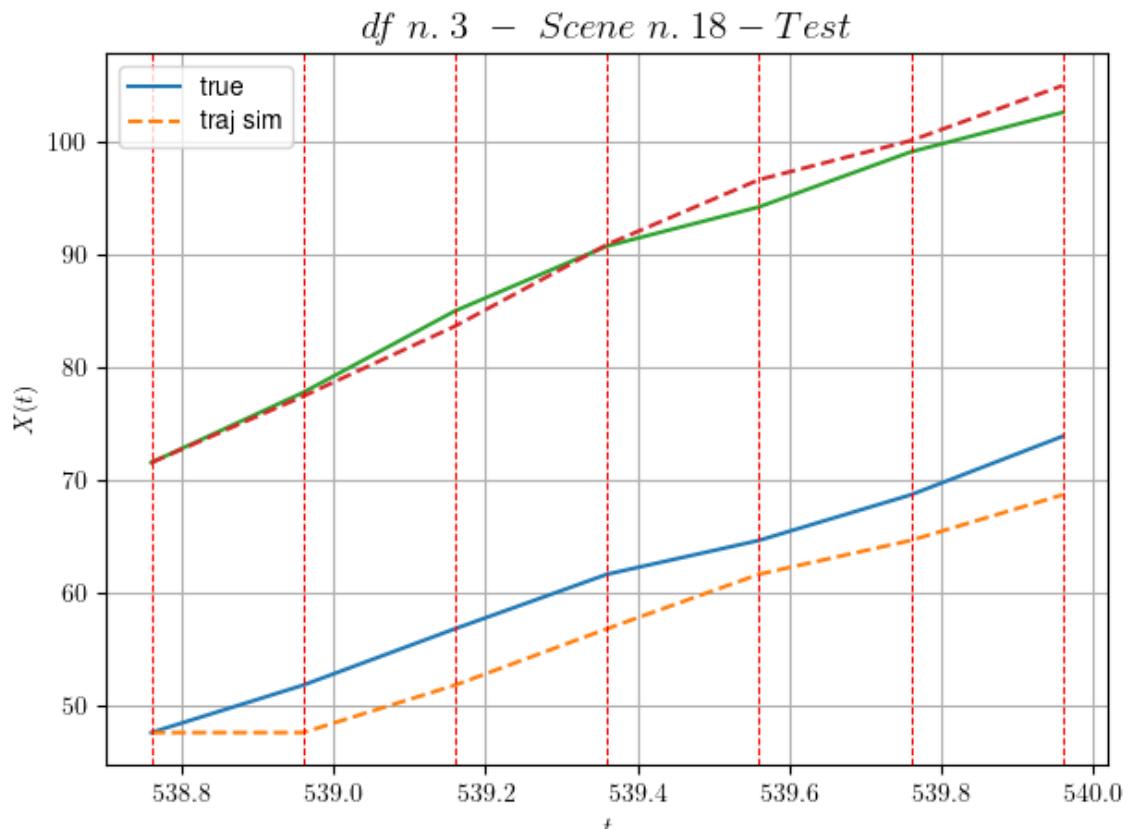
For scene 16/30:
* MSE = 25.157408718157946

DataFrame n.3. Scene n.17/30



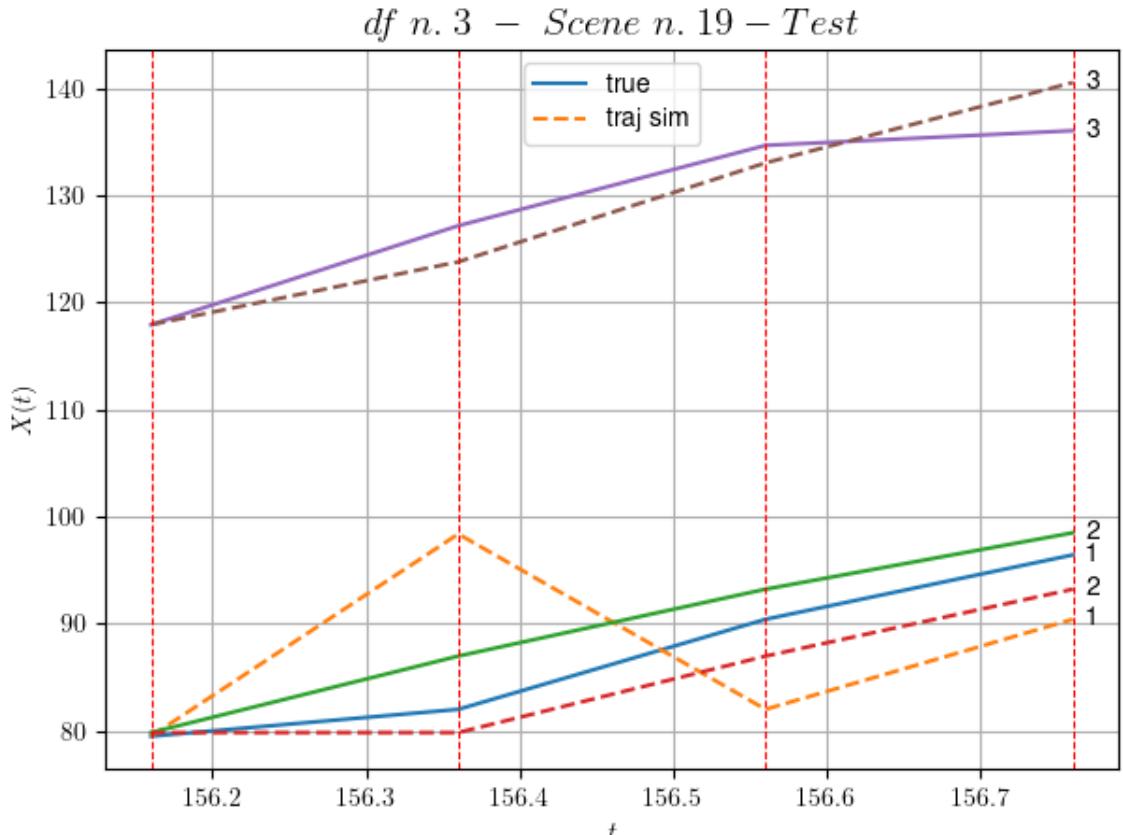
For scene 17/30:
* MSE = 20.06864982196602

DataFrame n.3. Scene n.18/30



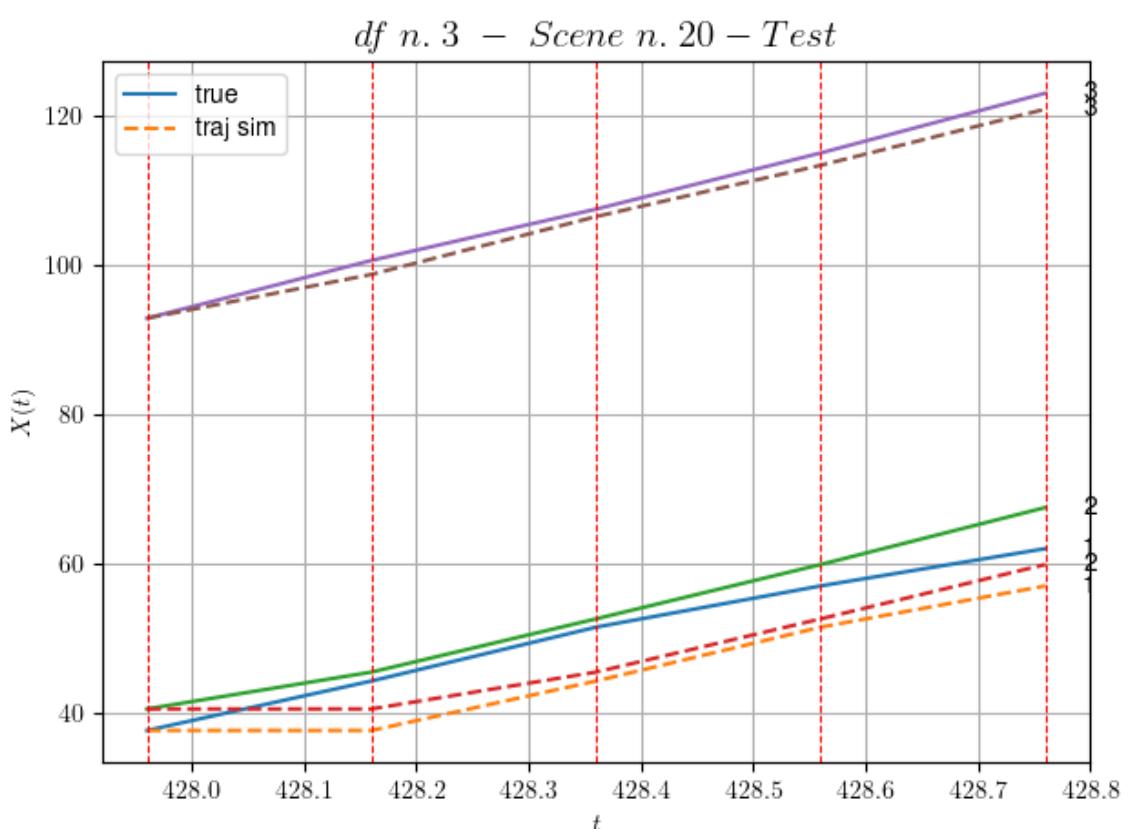
For scene 18/30:
* MSE = 9.456524156344653

DataFrame n.3. Scene n.19/30



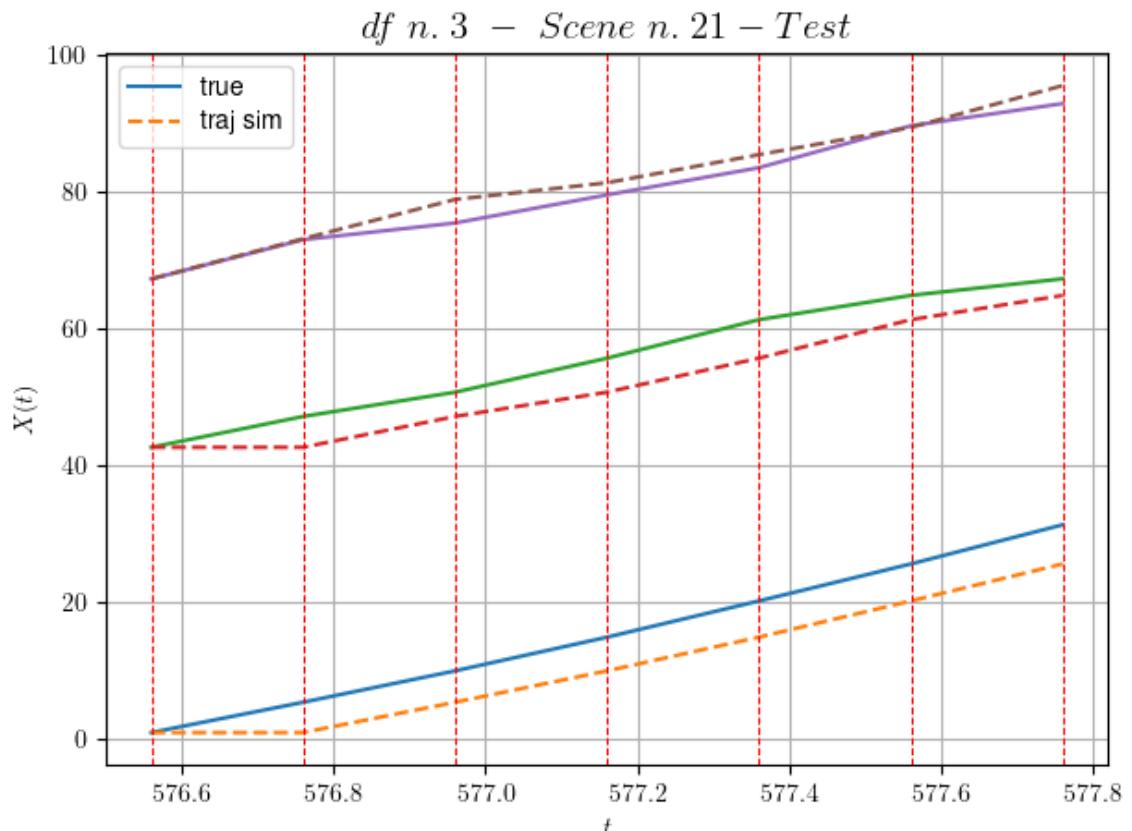
For scene 19/30:
* MSE = 43.981930748713104

DataFrame n.3. Scene n.20/30



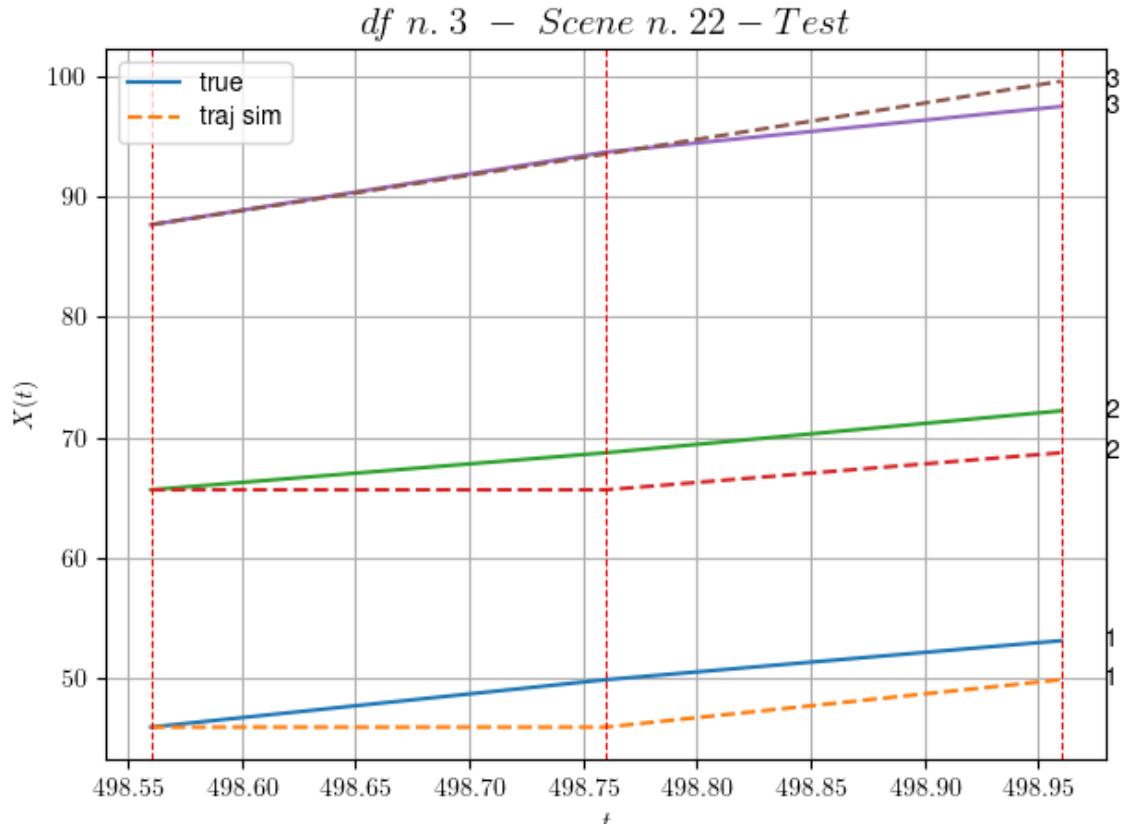
For scene 20/30:
* MSE = 23.33877297346356

DataFrame n.3. Scene n.21/30



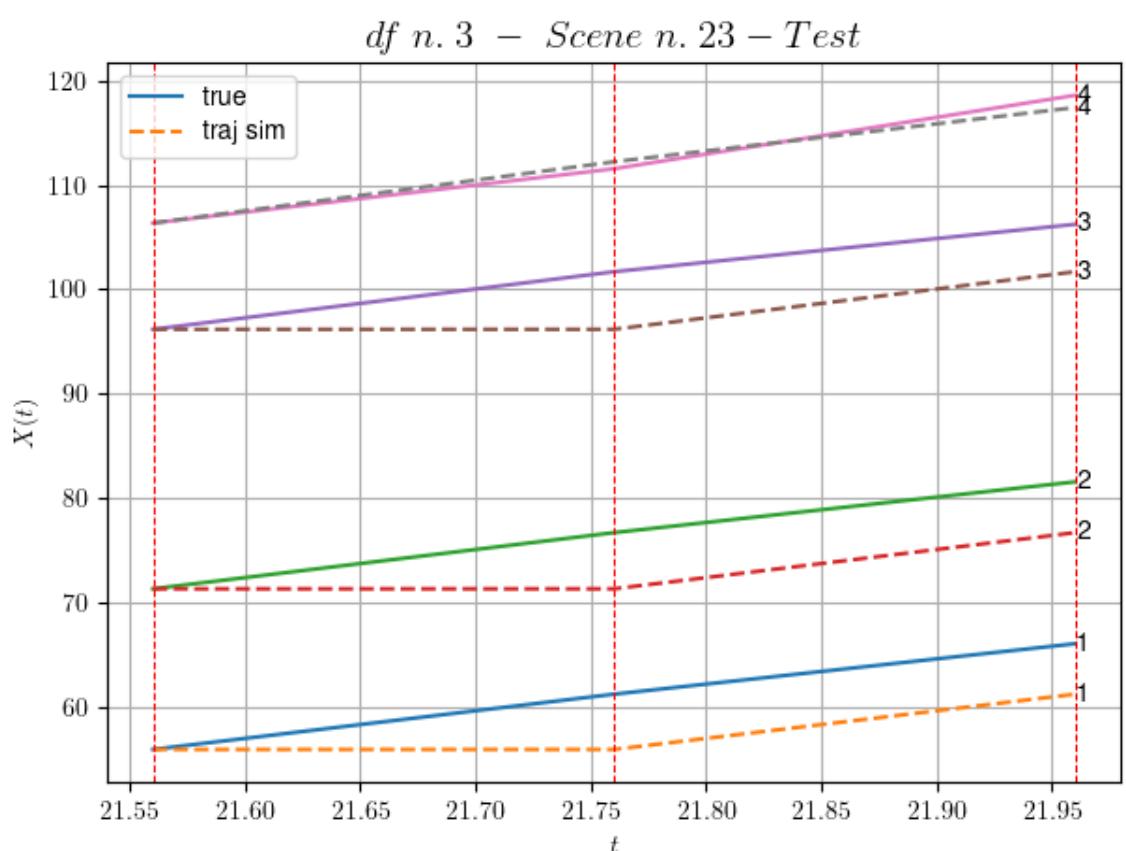
For scene 21/30:
* MSE = 13.691766294277775

DataFrame n.3. Scene n.22/30



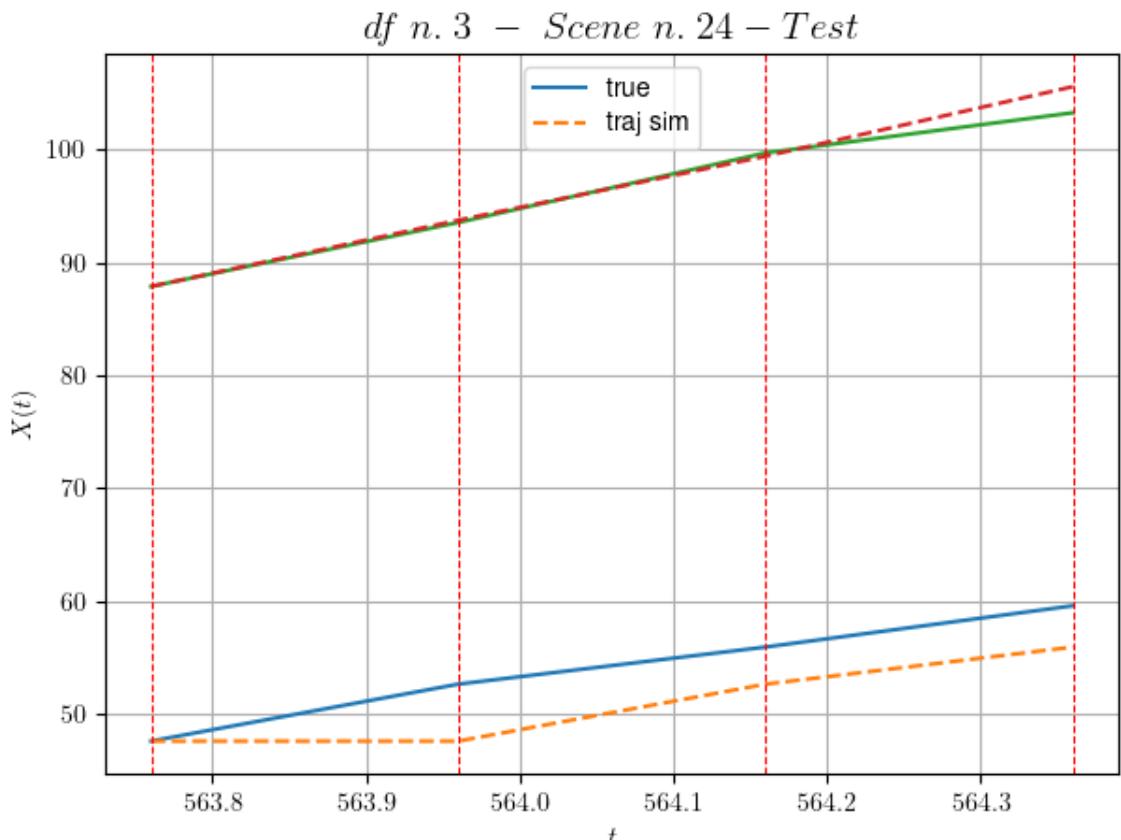
For scene 22/30:
* MSE = 5.763929621419629

DataFrame n.3. Scene n.23/30



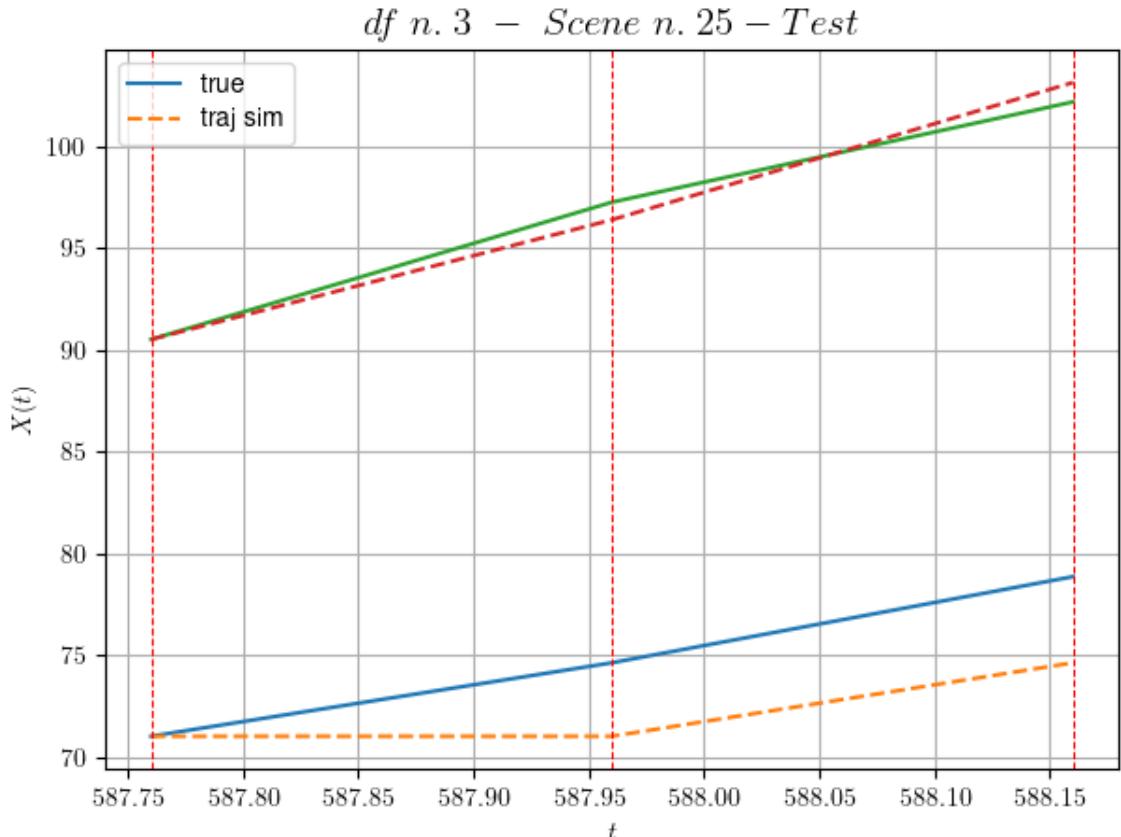
For scene 23/30:
* MSE = 13.098712332095989

DataFrame n.3. Scene n.24/30



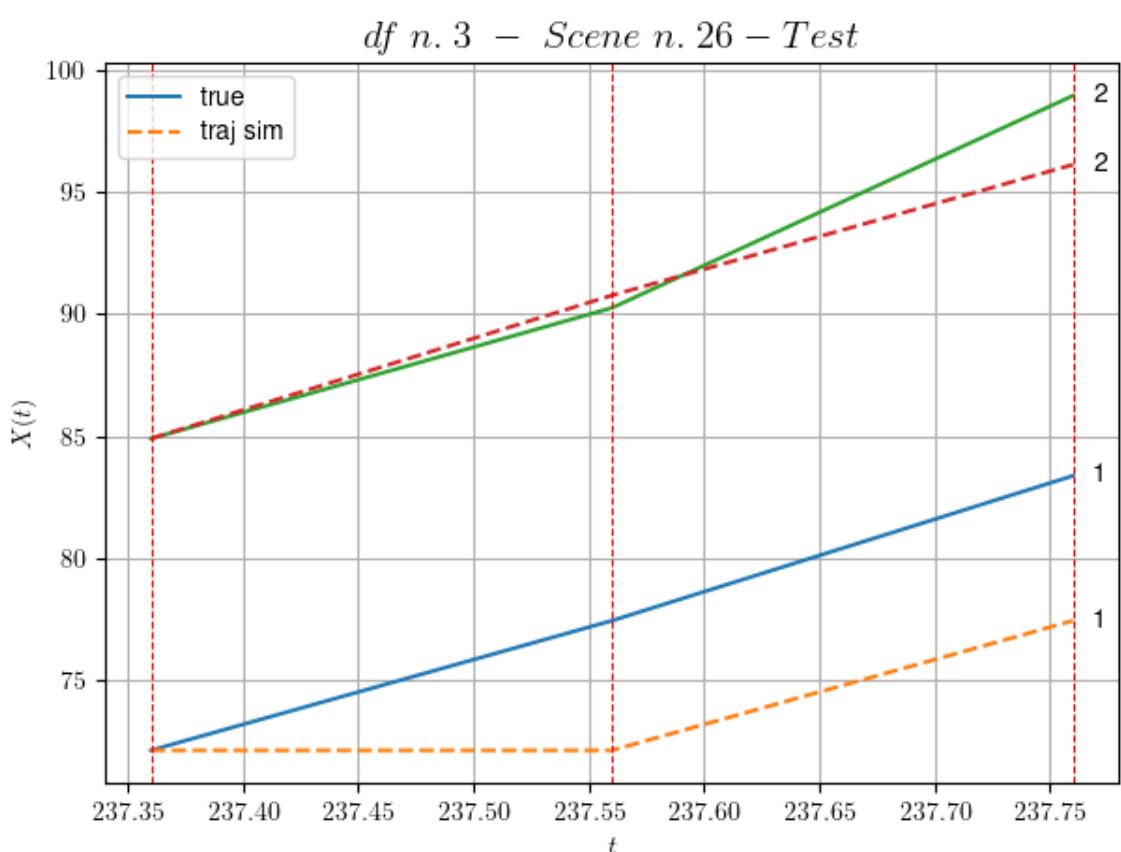
For scene 24/30:
* MSE = 6.902159302254612

DataFrame n.3. Scene n.25/30



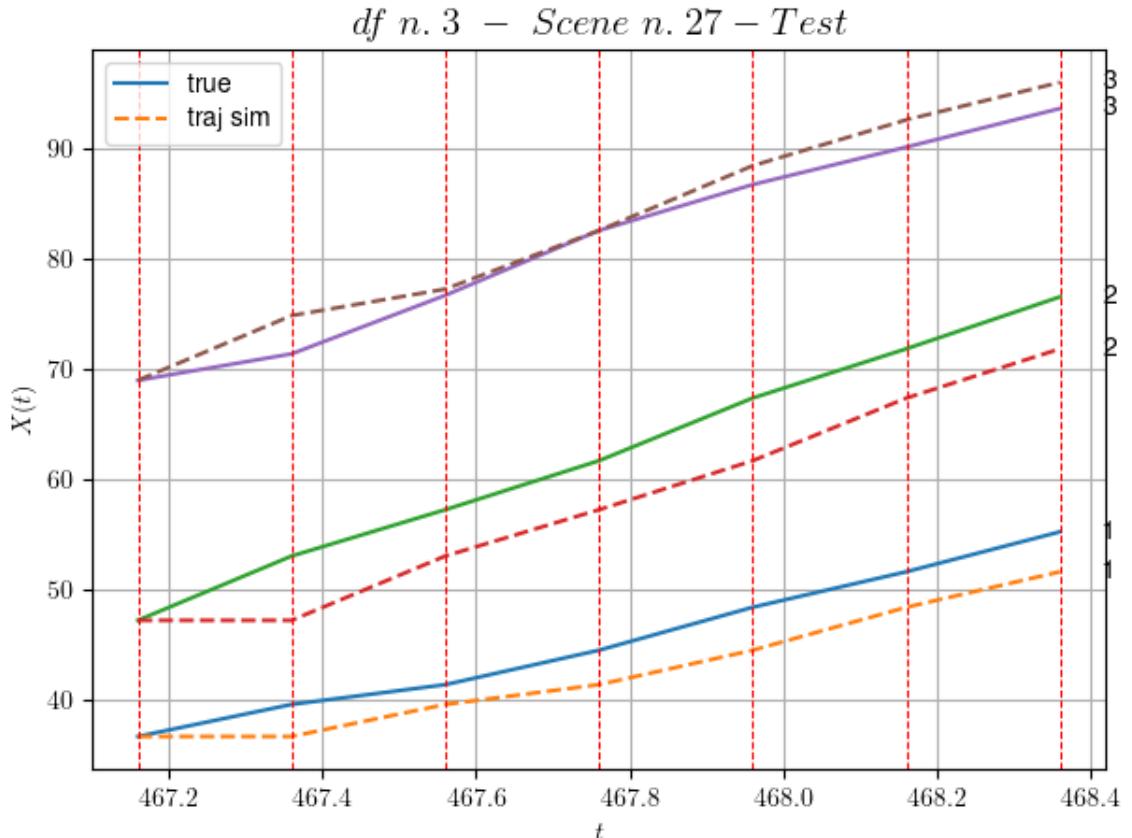
For scene 25/30:
* MSE = 5.419156049599008

DataFrame n.3. Scene n.26/30



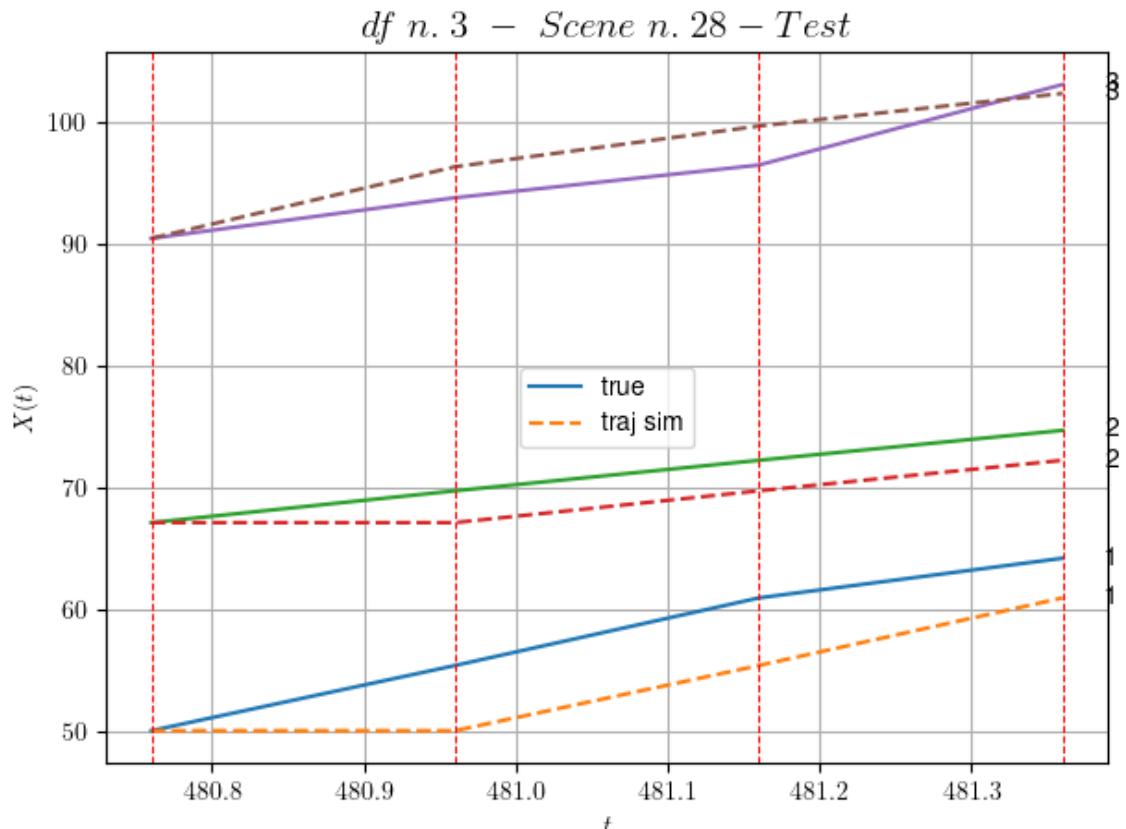
For scene 26/30:
* MSE = 11.969715707647094

DataFrame n.3. Scene n.27/30



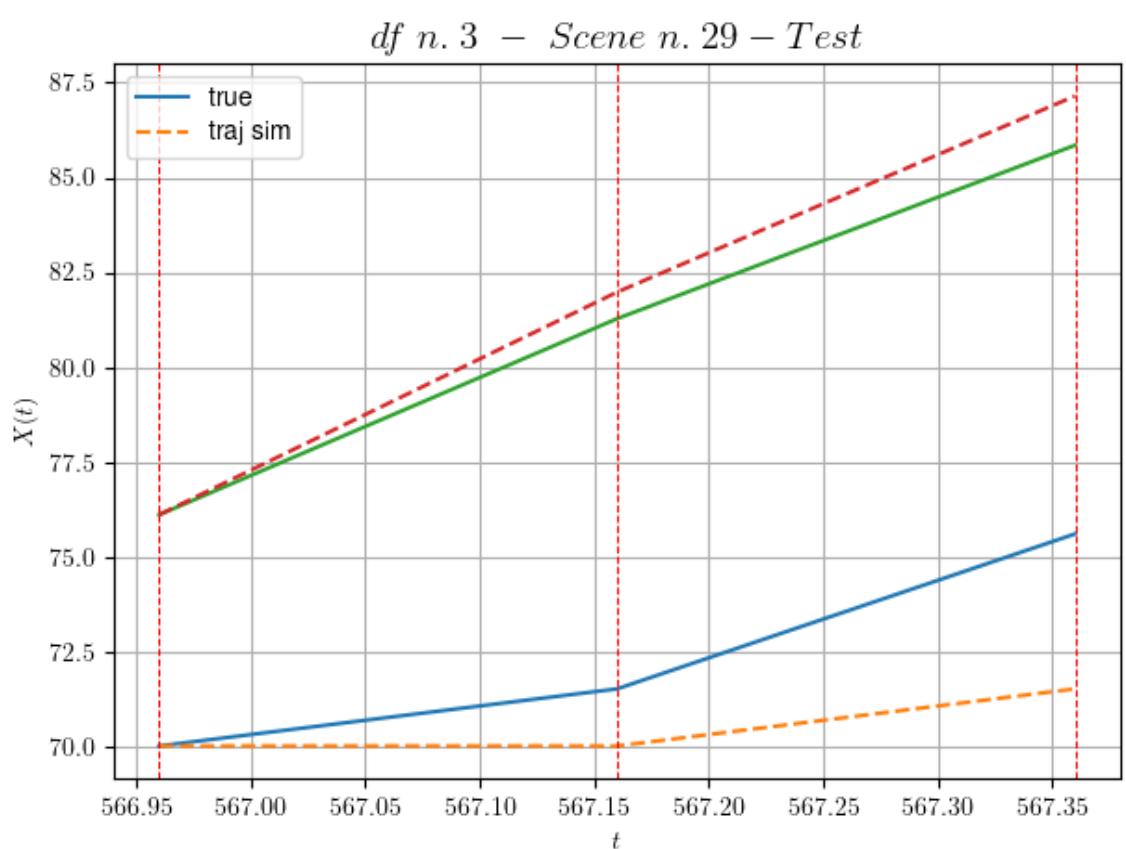
For scene 27/30:
* MSE = 11.094030226085005

DataFrame n.3. Scene n.28/30



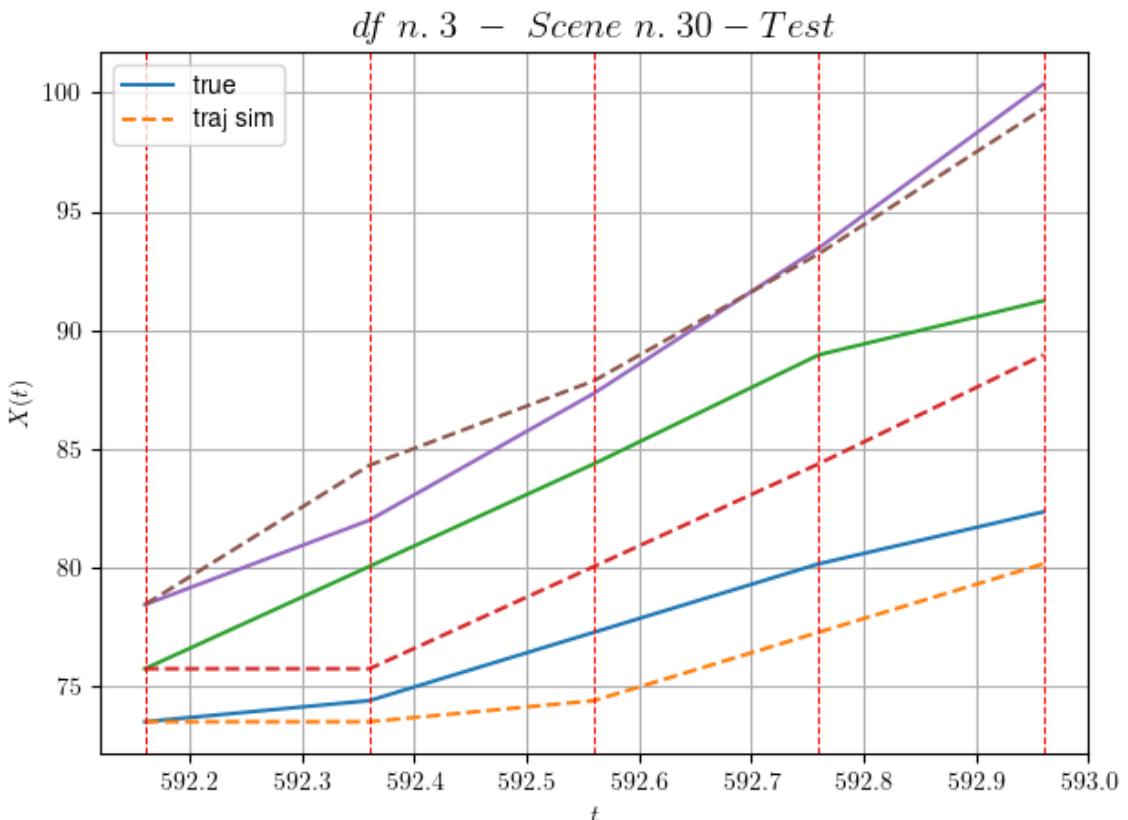
For scene 28/30:
* MSE = 8.841082679306105

DataFrame n.3. Scene n.29/30



For scene 29/30:
* MSE = 3.5243574315500137

DataFrame n.3. Scene n.30/30



For scene 30/30:
* MSE = 6.162651074324617

MSE test: 16.827803019347716

Summing up:
* MSE train: 6.070890017905175
* MSE test: 16.827803019347716

Analyzing 4/10 dfs.
In DataFrame n.4 we have 69 scenes.

To train the model we use 46 scenes, the remaining 23 to test the model.

Training step. (46 scenes)

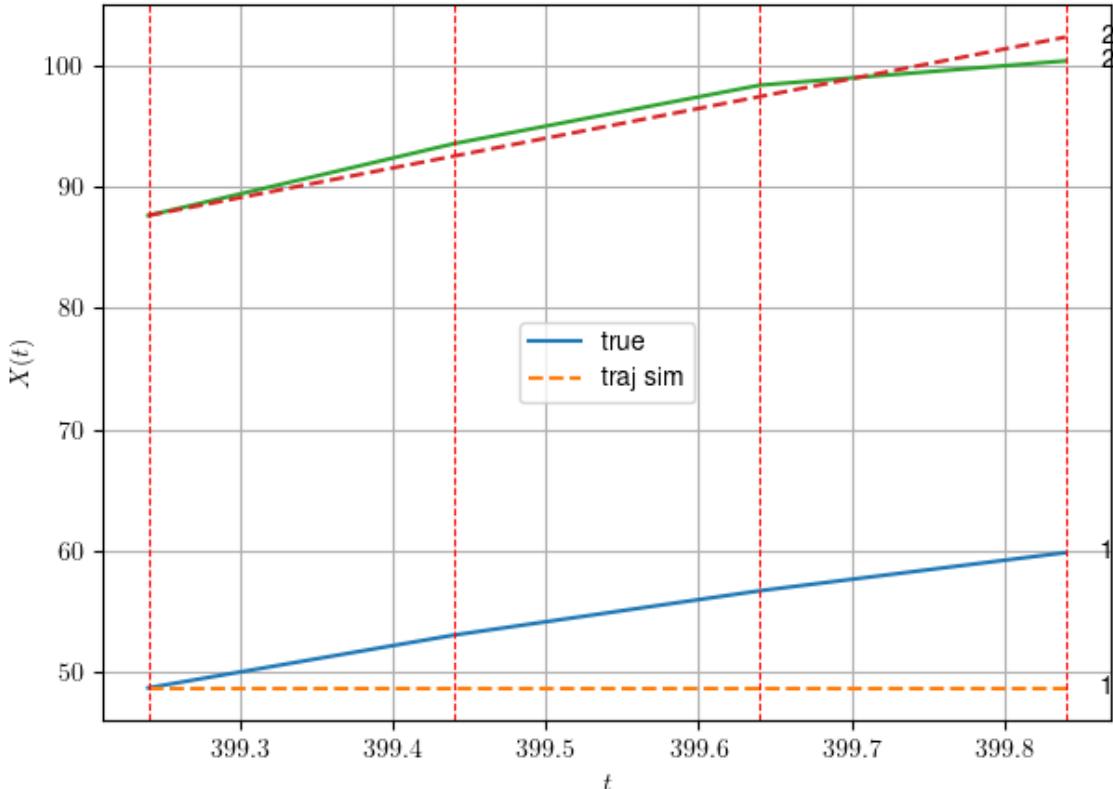
=====

DataFrame n.4. Scene n.1/46

=====

We have 3 time intervals inside [399.24,399.84]

df n. 4 – Scene n. 29, at it = 350



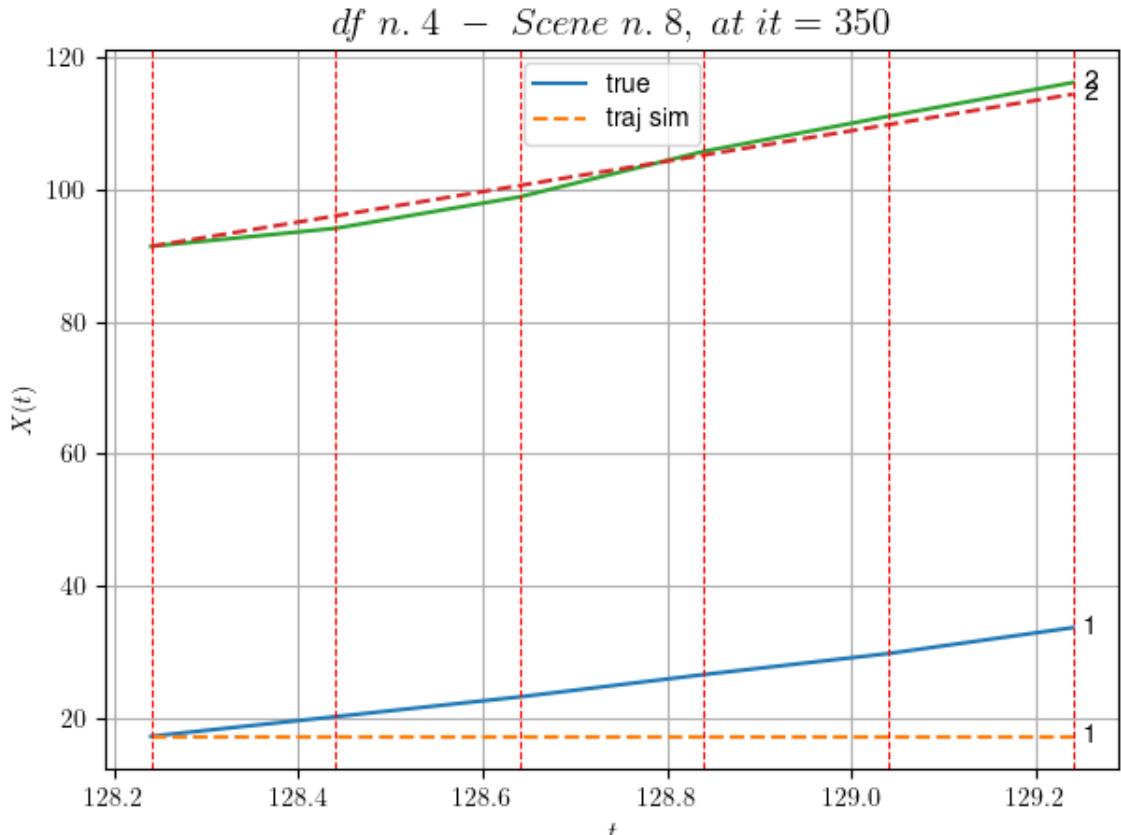
For scene 1/46:

* After LR finder: LR_NN=5e-05 with mse=3.820464527752067 at it=24
* v0 = 24.512386567495817
* MSE = 26.623016570278313
* iterations = 350

DataFrame n.4. Scene n.2/46

=====

We have 5 time intervals inside [128.24,129.24]



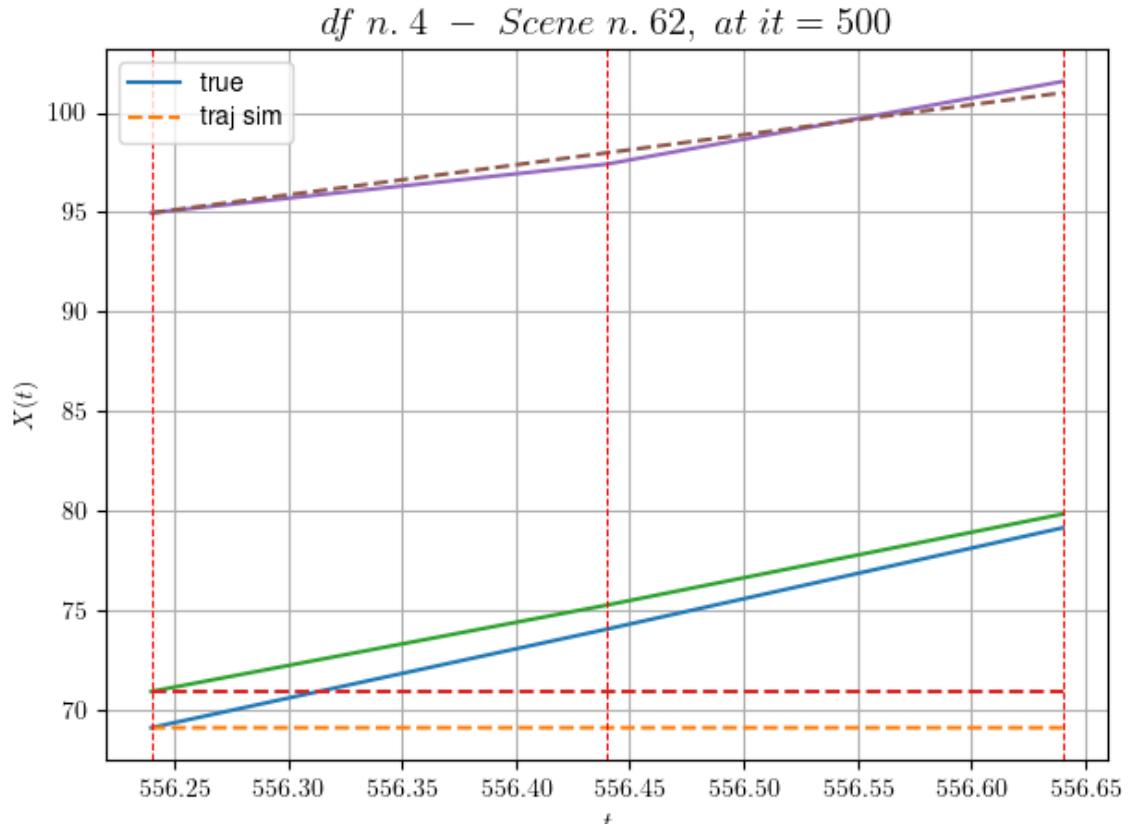
For scene 2/46:

* After LR finder: LR_NN=1e-05 with mse=7.57783051237765 at
it=24

- * $v_0 = 23.00518114624755$
- * MSE = 47.262875019614235
- * iterations = 350

DataFrame n.4. Scene n.3/46

We have 2 time intervals inside [556.24, 556.64]

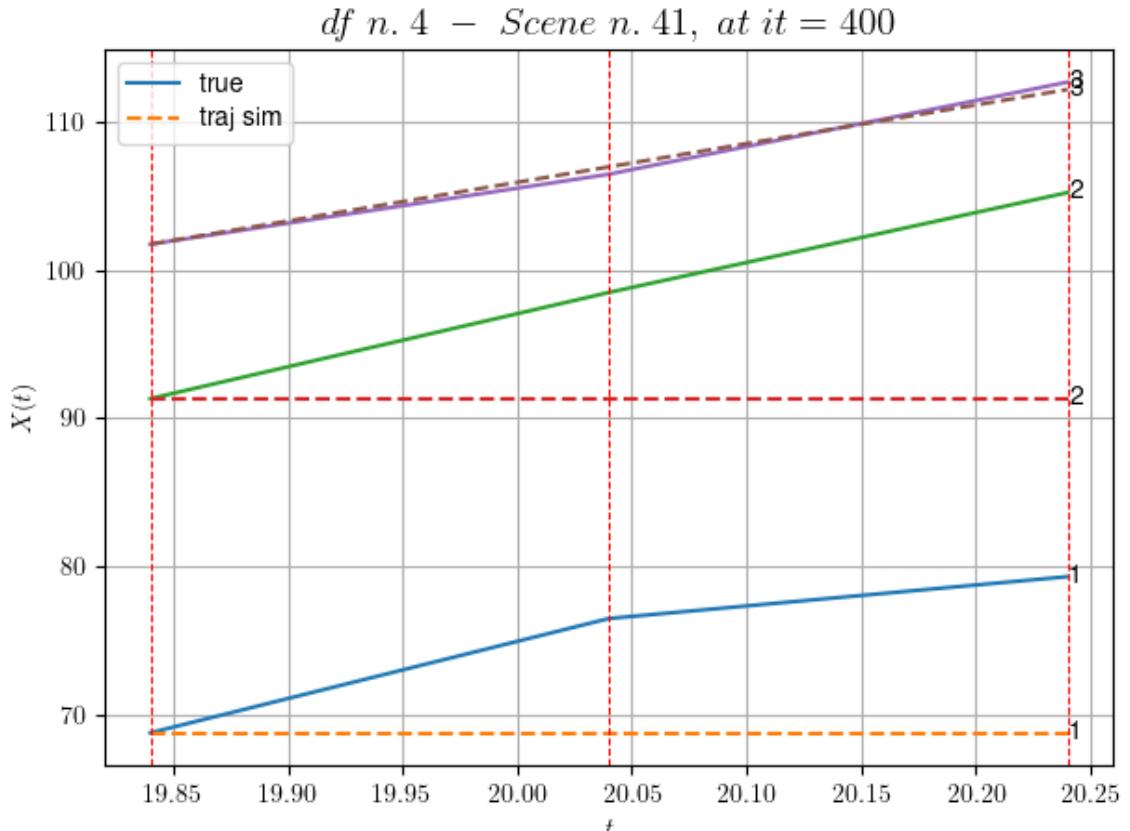


For scene 3/46:

* After LR finder: $LR_NN=0.001$ with $mse=13.007195654780064$
at $it=24$
* $v_0 = 15.086092436632507$
* $MSE = 24.904825962155346$
* iterations = 500

DataFrame n.4. Scene n.4/46

We have 2 time intervals inside [19.84,20.24]

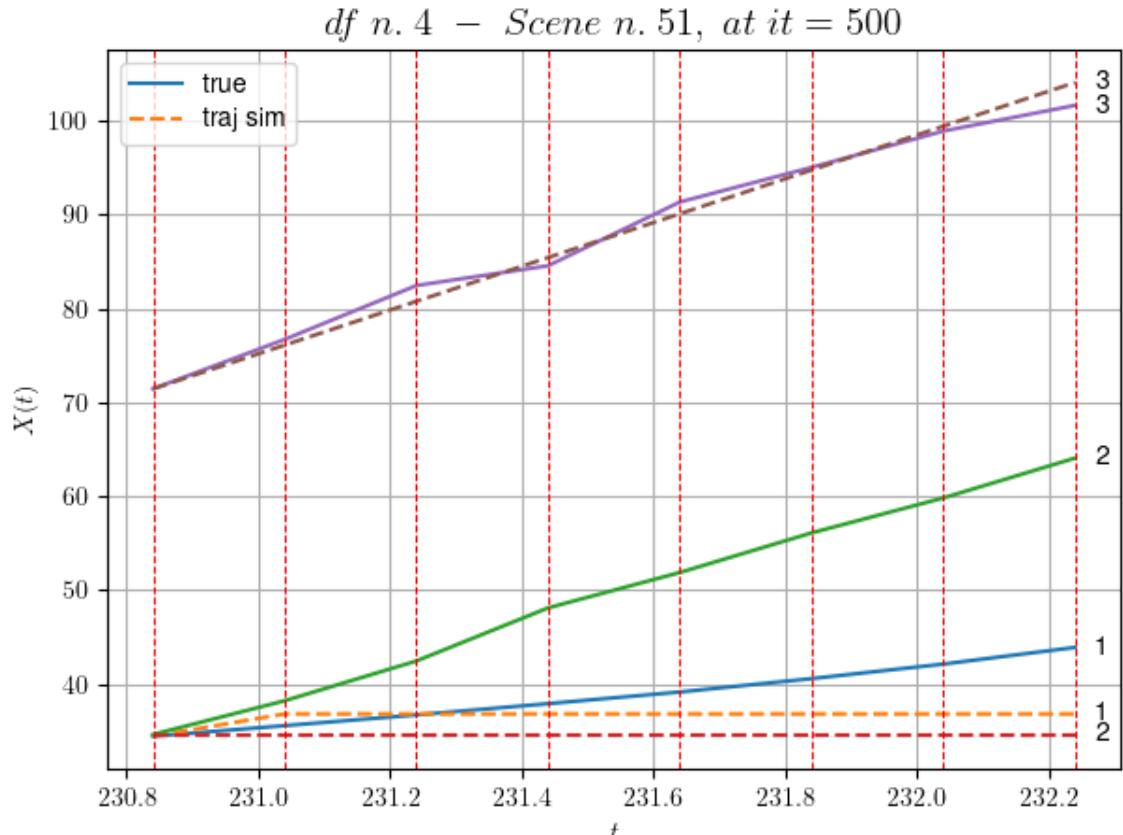


For scene 4/46:

- * After LR finder: LR_NN=0.0001 with mse=10.991944709211941
- at it=24
 - * v0 = 26.058971753815722
 - * MSE = 46.031106849750635
 - * iterations = 400

DataFrame n.4. Scene n.5/46

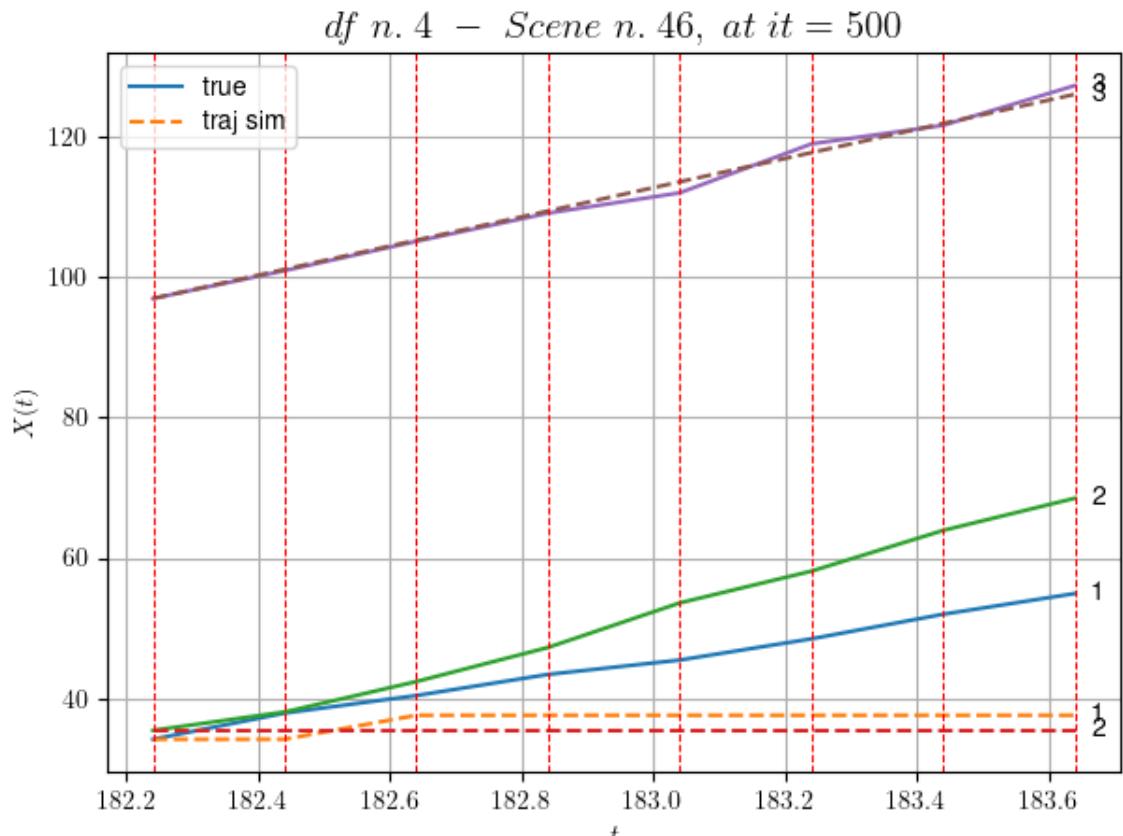
We have 7 time intervals inside [230.84,232.24]



For scene 5/46:
* After LR finder: LR_NN=0.0005 with mse=20.278753922437105
at it=24
* v0 = 23.322723002586642
* MSE = 108.43459340123881
* iterations = 500

DataFrame n.4. Scene n.6/46

We have 7 time intervals inside [182.24,183.64]

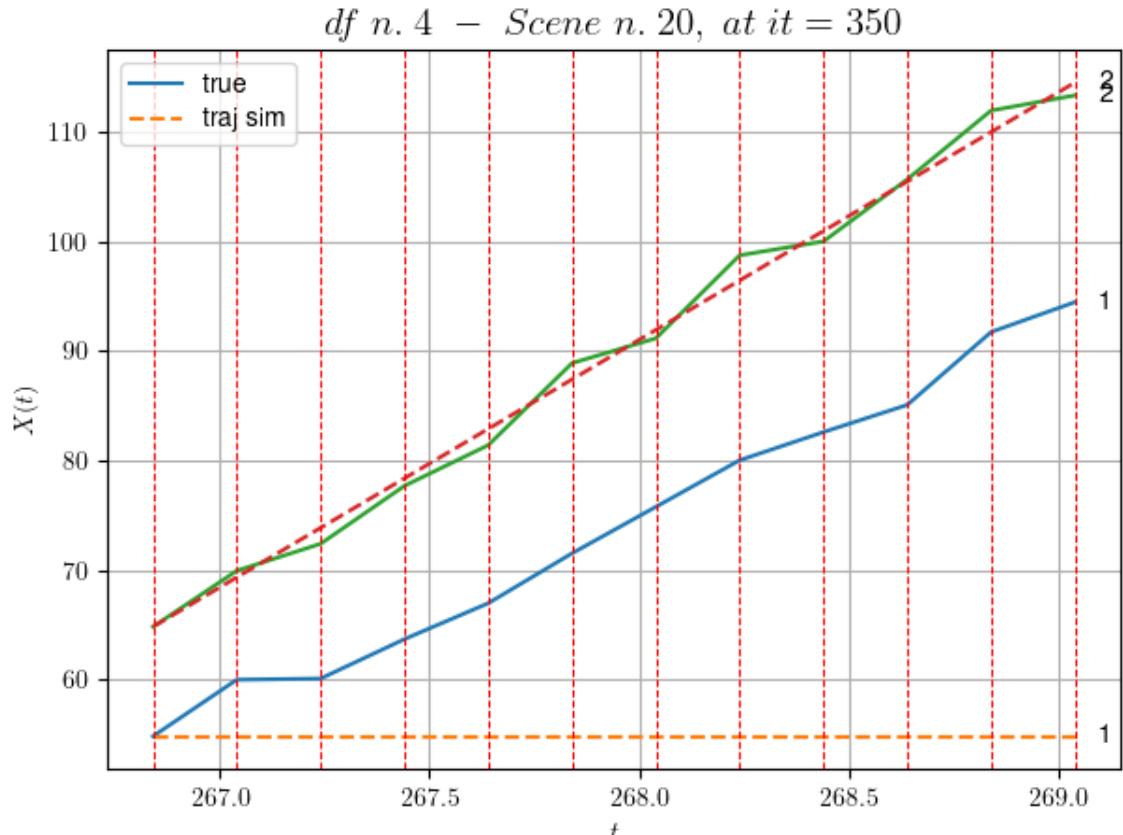


For scene 6/46:

* After LR finder: LR_NN=0.0005 with mse=44.89262072376588
at it=24
* $v_0 = 20.773199567272343$
* MSE = 153.8420931754874
* iterations = 500

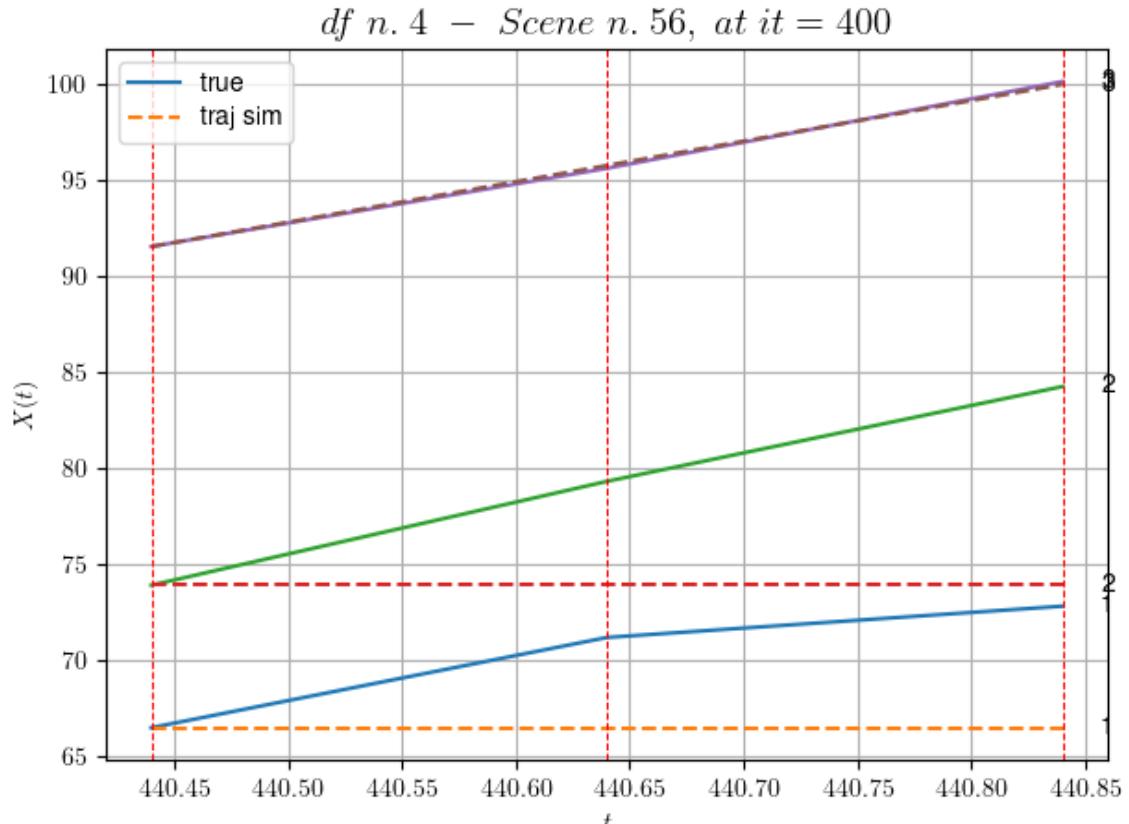
DataFrame n.4. Scene n.7/46

We have 11 time intervals inside [266.84, 269.04]



DataFrame n.4. Scene n.8/46

We have 2 time intervals inside [440.44,440.84]

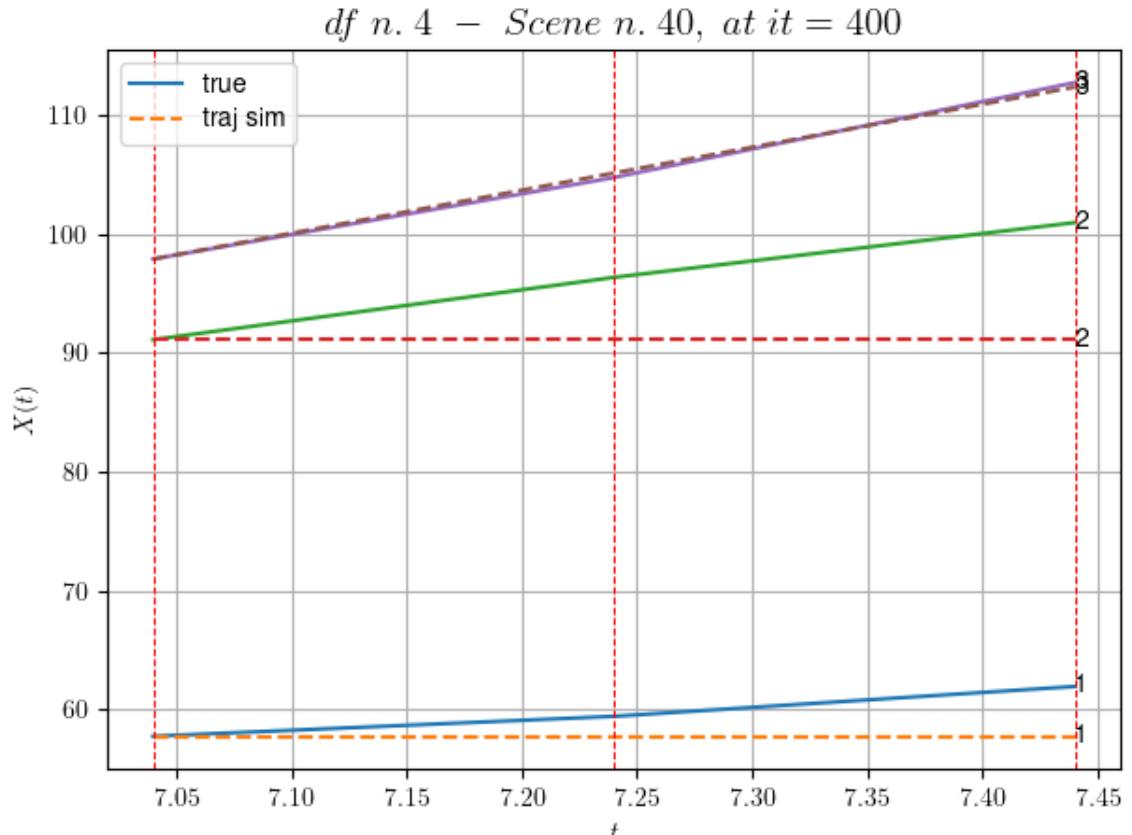


For scene 8/46:

* After LR finder: $LR_NN=0.0005$ with $mse=2.8251438601170356$
at $it=24$
* $v_0 = 21.12700594220182$
* $MSE = 22.07046750104567$
* iterations = 400

DataFrame n.4. Scene n.9/46

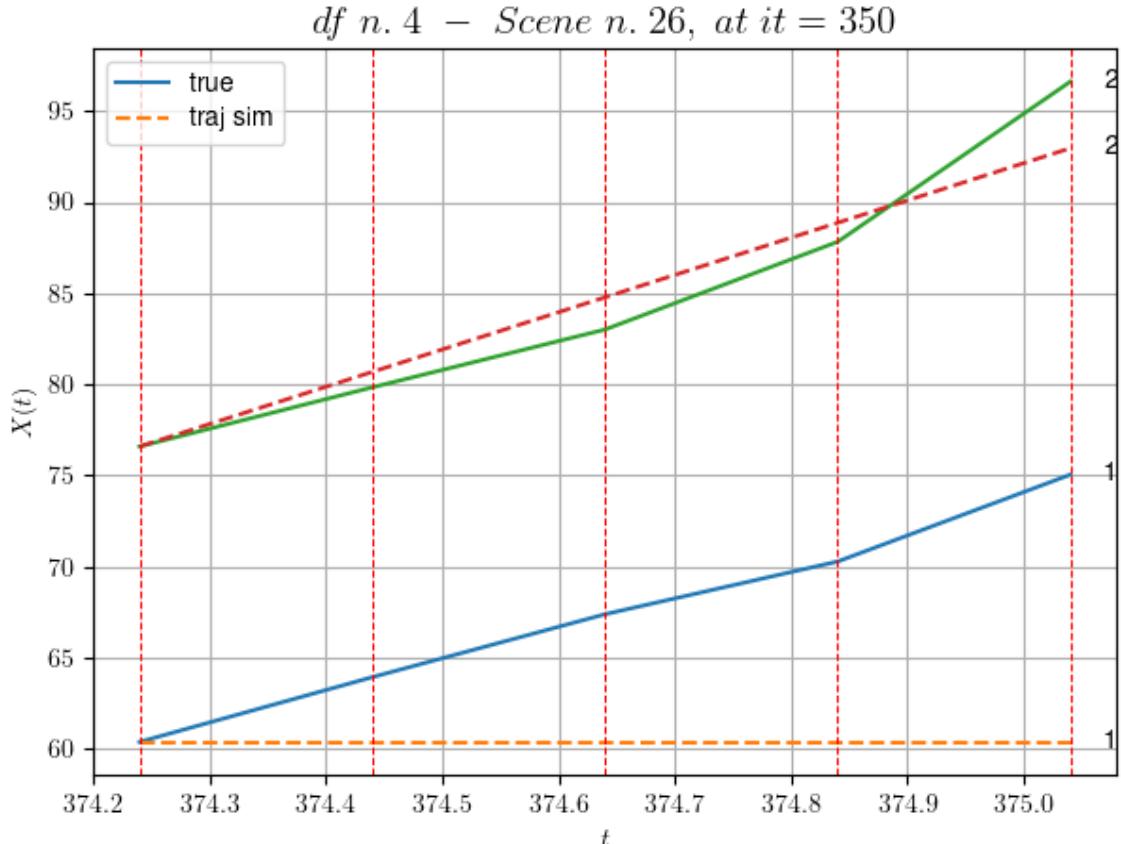
We have 2 time intervals inside [7.04, 7.44]



For scene 9/46:
* After LR finder: LR_NN=0.001 with mse=11.136572403001468
at it=24
* v0 = 36.154222418218616
* MSE = 16.10166567553046
* iterations = 400

DataFrame n.4. Scene n.10/46

We have 4 time intervals inside [374.24,375.04]

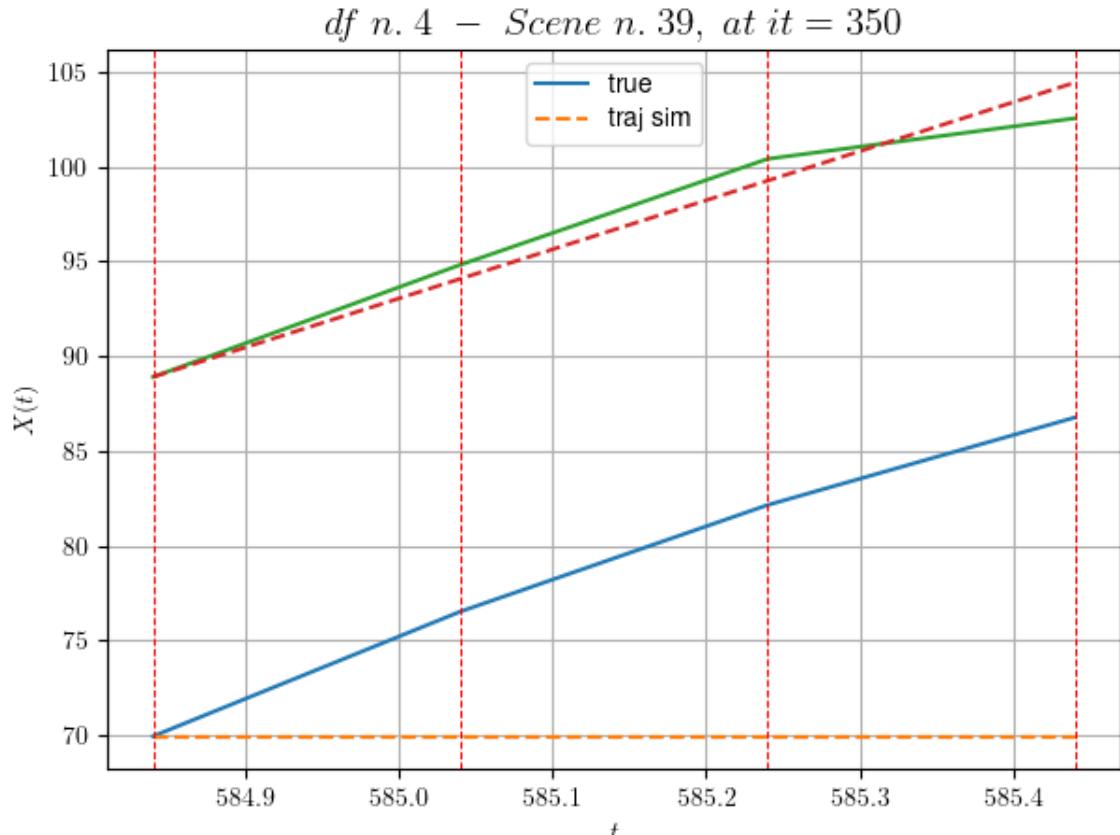


For scene 10/46:

- * After LR finder: LR_NN=5e-05 with mse=10.1063820018548 at it=24
- * v0 = 20.4757221969534
- * MSE = 39.198844393745695
- * iterations = 350

DataFrame n.4. Scene n.11/46

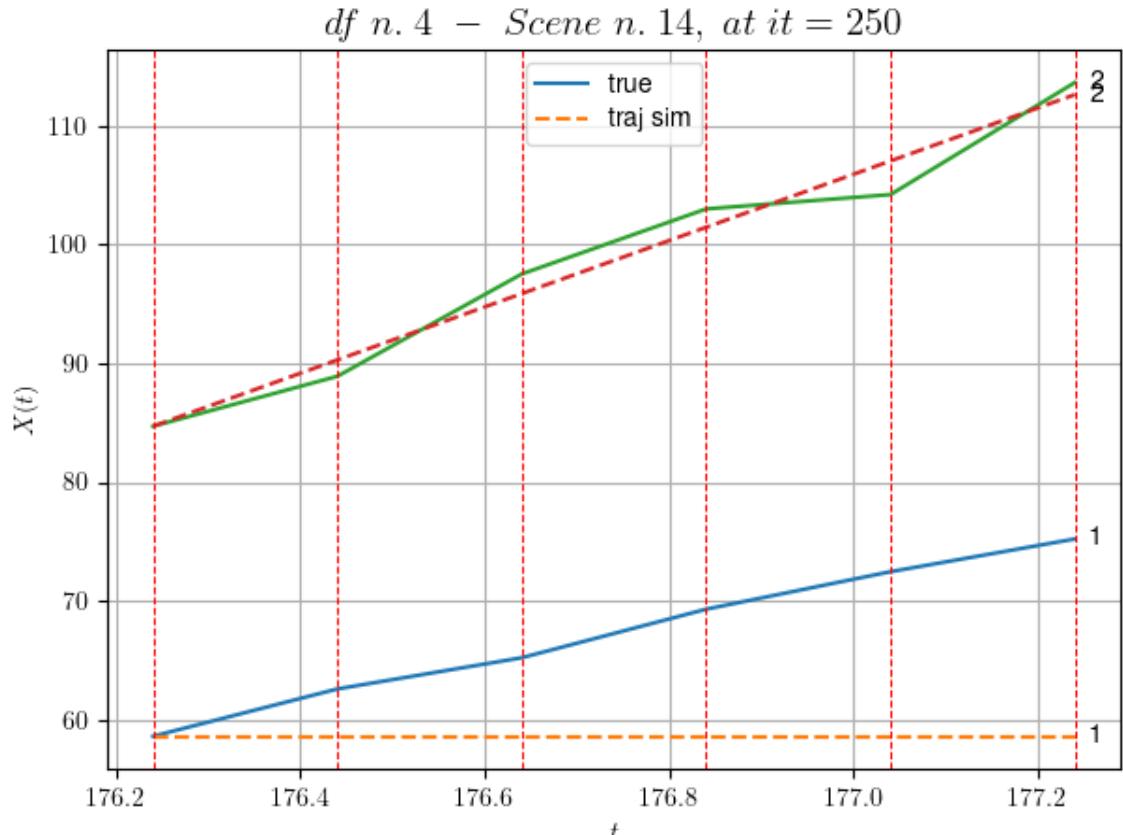
We have 3 time intervals inside [584.84,585.44]



For scene 11/46:
* After LR finder: LR_NN=5e-05 with mse=2.6156428692823845
at it=24
* v0 = 25.889440598768015
* MSE = 60.043562018947604
* iterations = 350

DataFrame n.4. Scene n.12/46

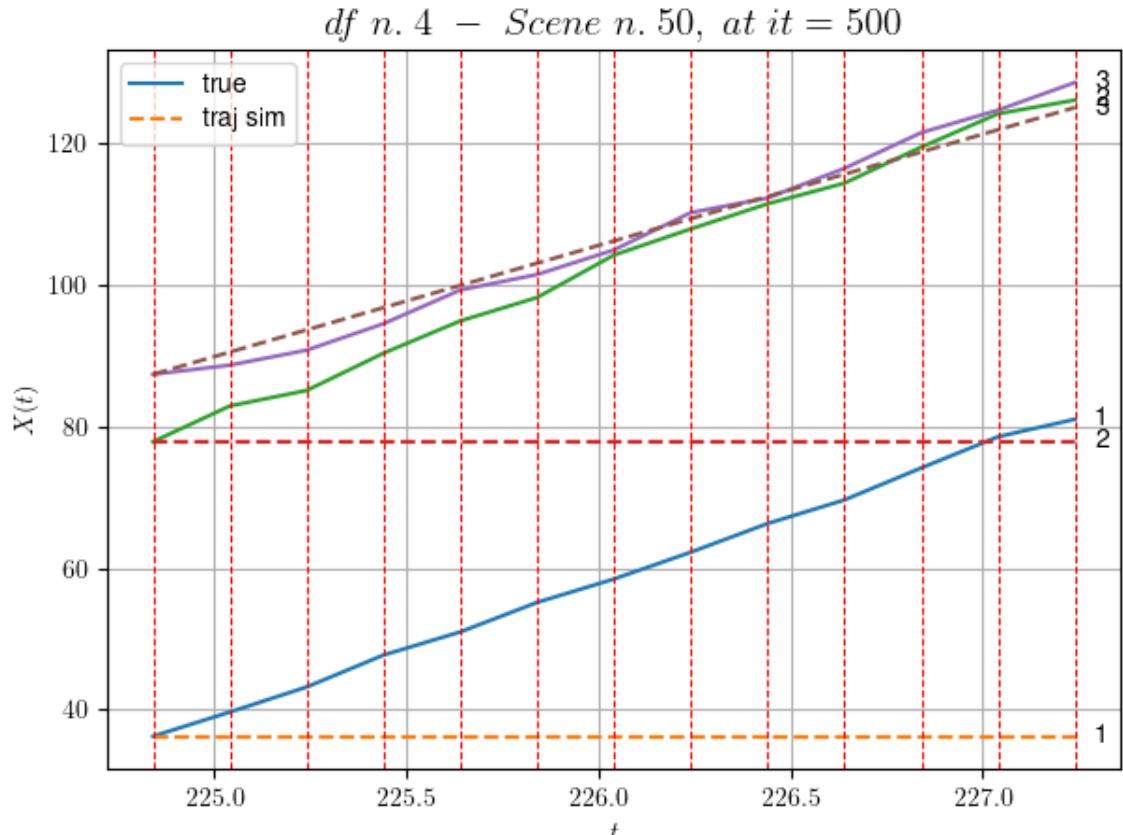
We have 5 time intervals inside [176.24,177.24]



For scene 12/46:
* After LR finder: LR_NN=0.0001 with mse=2.6192238171557243
at it=24
* v0 = 27.94820359603319
* MSE = 54.92471327299091
* iterations = 250

DataFrame n.4. Scene n.13/46

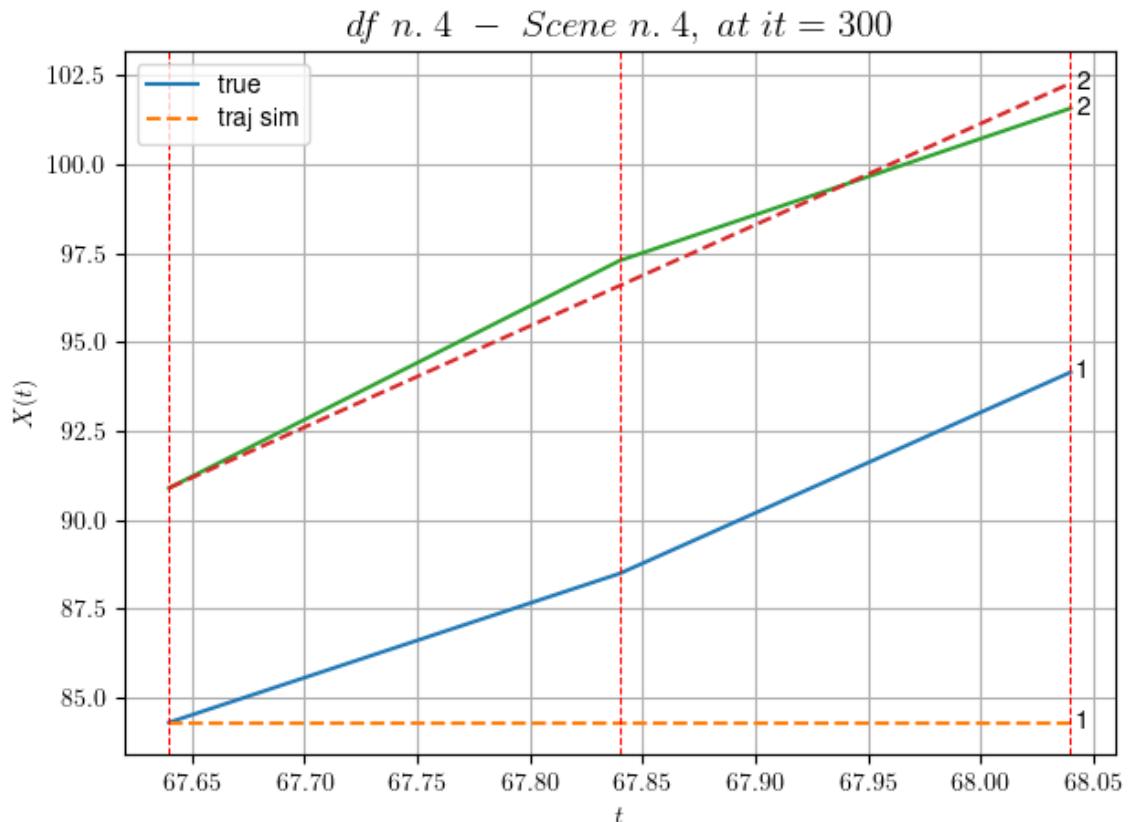
We have 12 time intervals inside [224.84, 227.24]



For scene 13/46:
* After LR finder: LR_NN=0.0005 with mse=223.34972648825678
at it=24
* v0 = 15.713677130054716
* MSE = 524.8065072964439
* iterations = 500

DataFrame n.4. Scene n.14/46

We have 2 time intervals inside [67.64,68.04]

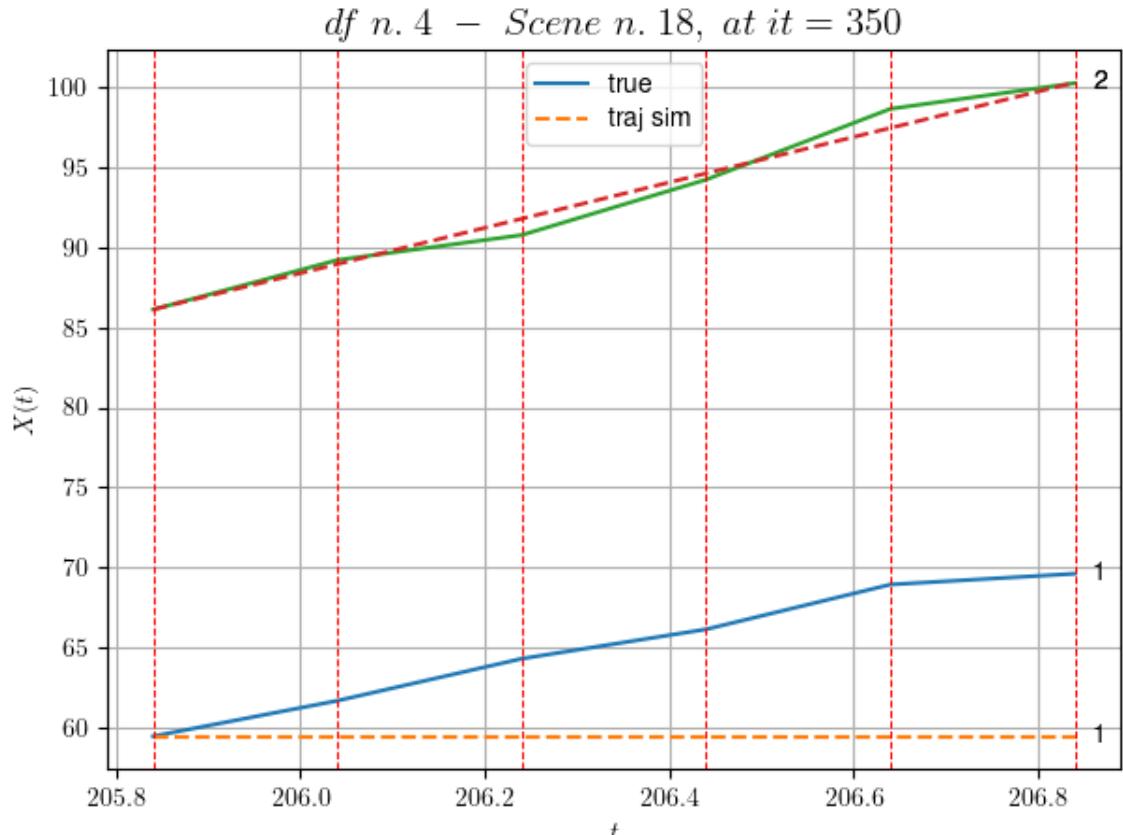


For scene 14/46:

* After LR finder: LR_NN=0.001 with mse=0.3158506460172597
at it=24
* v0 = 28.46498034303023
* MSE = 19.26738369493693
* iterations = 300

DataFrame n.4. Scene n.15/46

We have 5 time intervals inside [205.84,206.84]

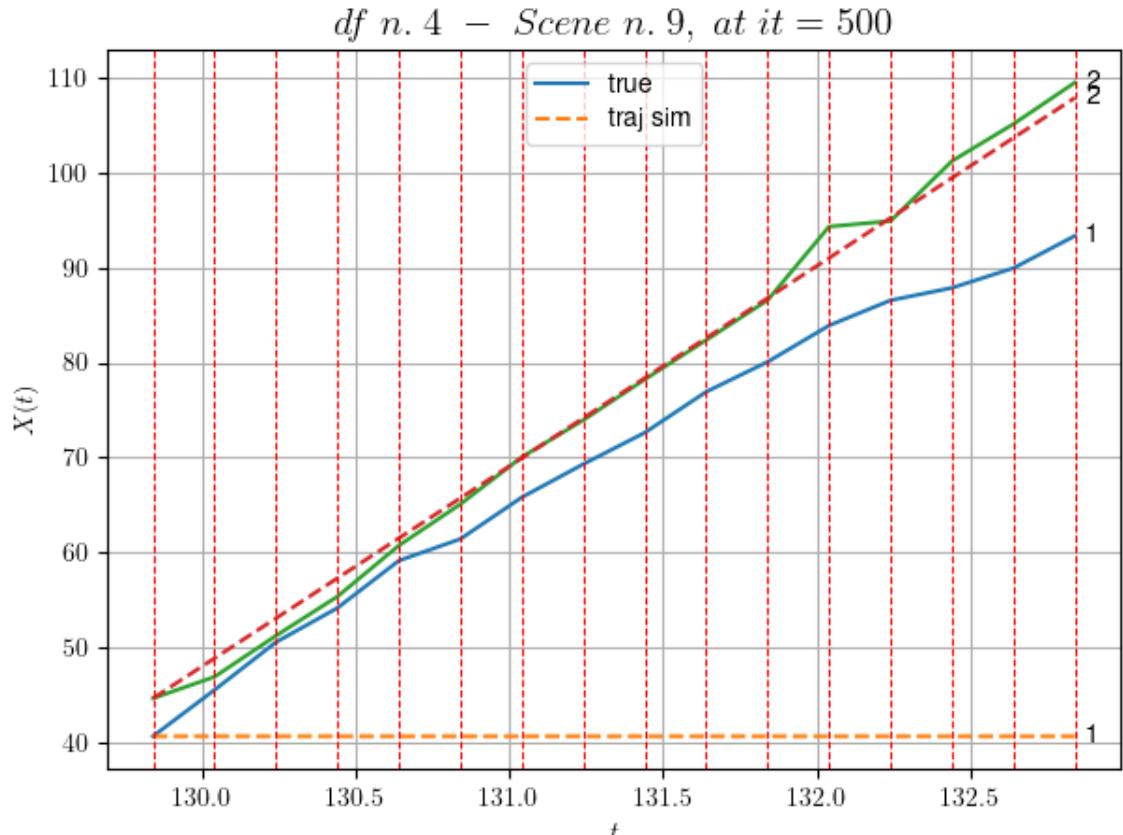


For scene 15/46:

- * After LR finder: LR_NN=5e-05 with mse=45.521518805642586
- at it=24
- * v0 = 14.20494348674427
- * MSE = 22.462205072422087
- * iterations = 350

DataFrame n.4. Scene n.16/46

We have 15 time intervals inside [129.84,132.84]

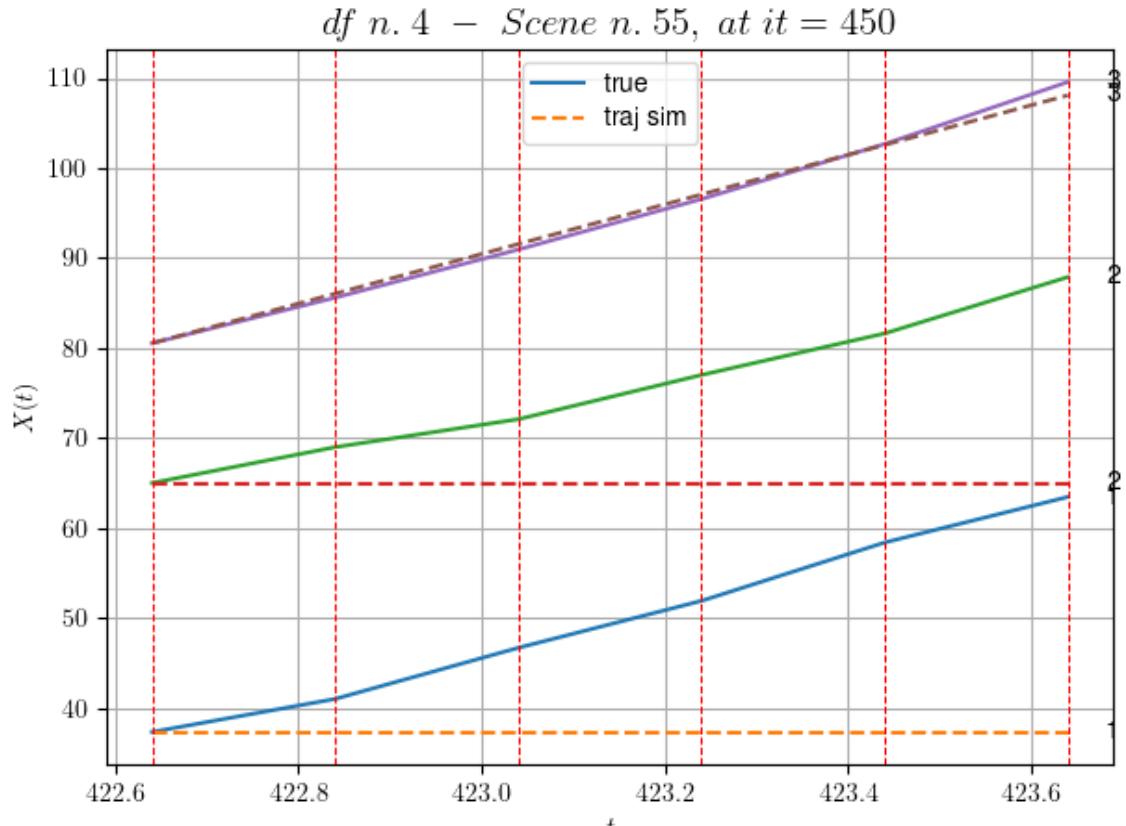


For scene 16/46:

- * After LR finder: LR_NN=0.001 with mse=119.63303694061983
- at it=24
 - * v0 = 21.068534244852284
 - * MSE = 557.7877630550317
 - * iterations = 500

DataFrame n.4. Scene n.17/46

We have 5 time intervals inside [422.64, 423.64]

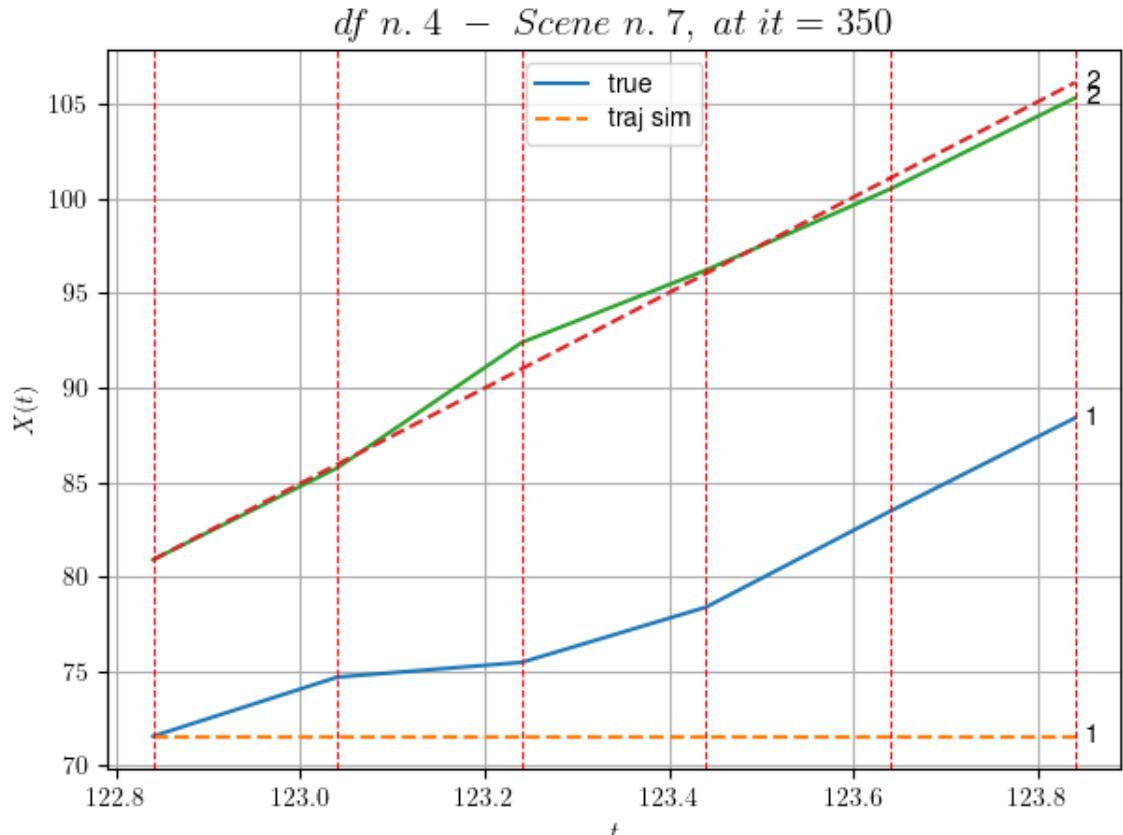


For scene 17/46:

* After LR finder: LR_NN=1e-05 with mse=2.5512261124339077
at it=24
* v0 = 27.54509009891539
* MSE = 136.15186592695537
* iterations = 450

DataFrame n.4. Scene n.18/46

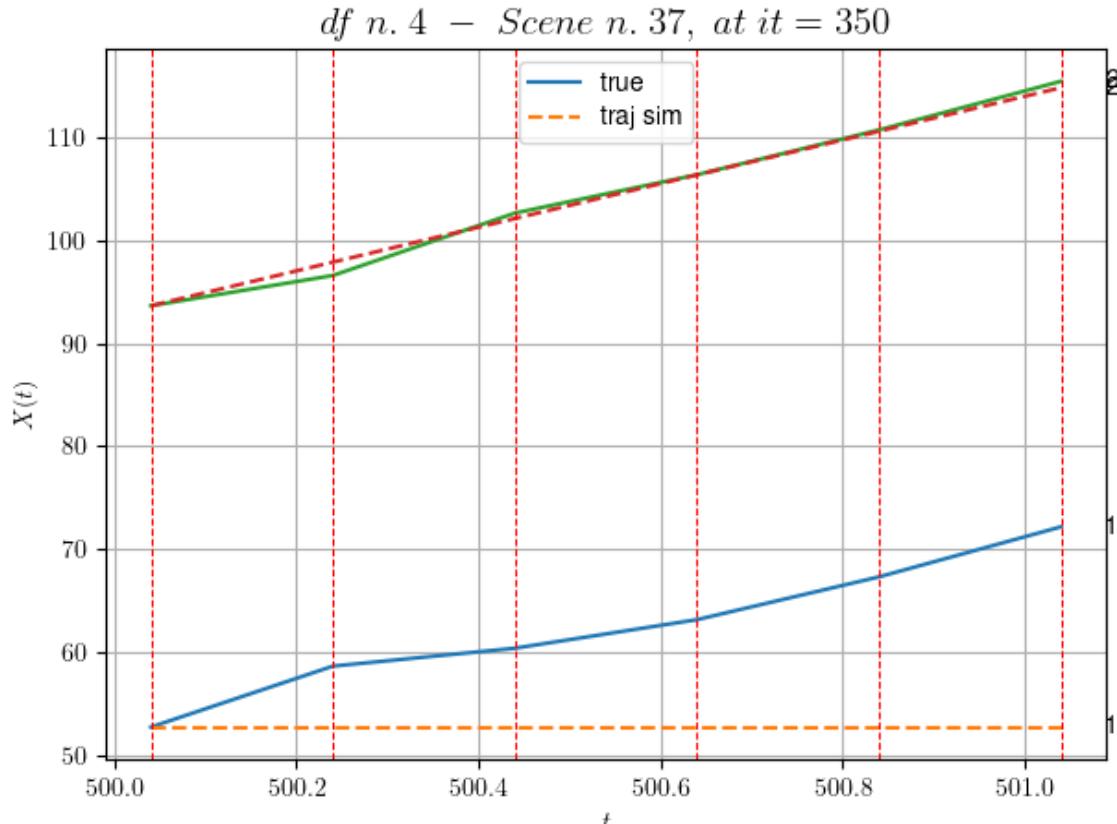
We have 5 time intervals inside [122.84,123.84]



For scene 18/46:
* After LR finder: LR_NN=0.001 with mse=5.396323593597007 at it=24
* v0 = 25.259320088068712
* MSE = 41.718814519052465
* iterations = 350

DataFrame n.4. Scene n.19/46

We have 5 time intervals inside [500.04,501.04]

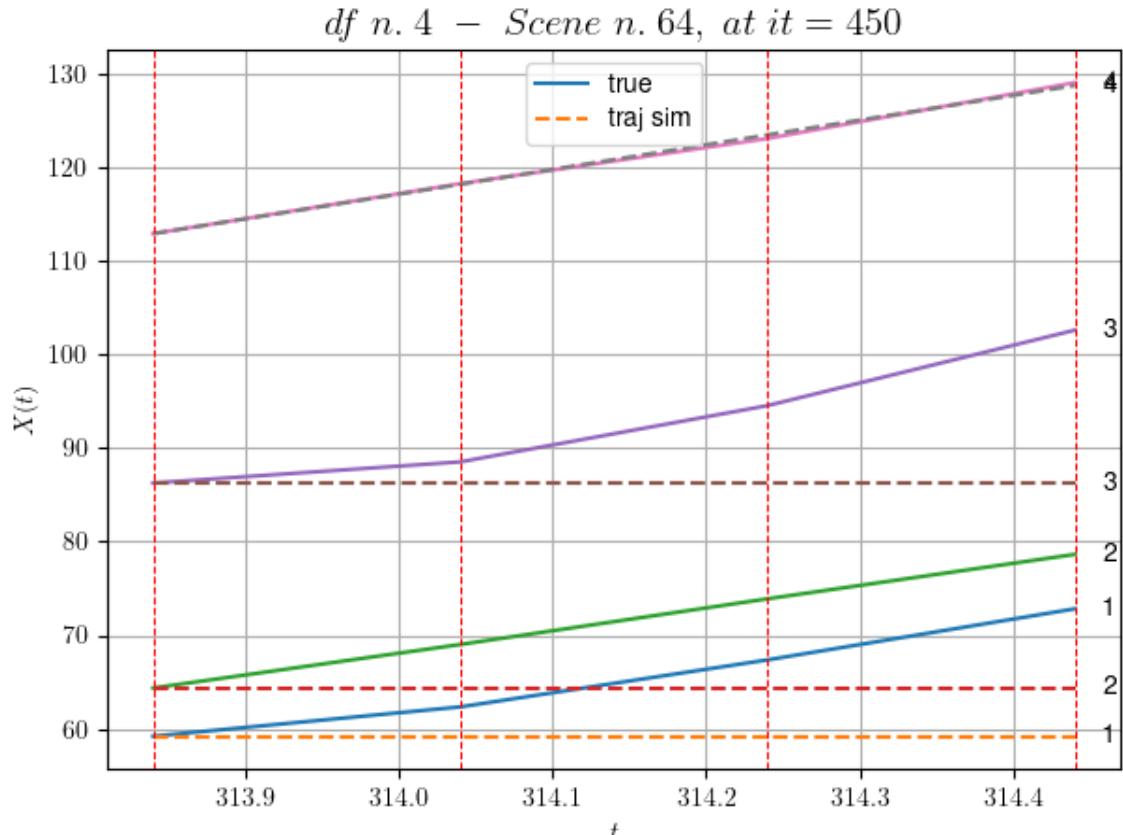


For scene 19/46:

* After LR finder: LR_NN=1e-05 with mse=13.95261366758346 at it=24
* vθ = 21.189572643128614
* MSE = 66.36758159052289
* iterations = 350

DataFrame n.4. Scene n.20/46

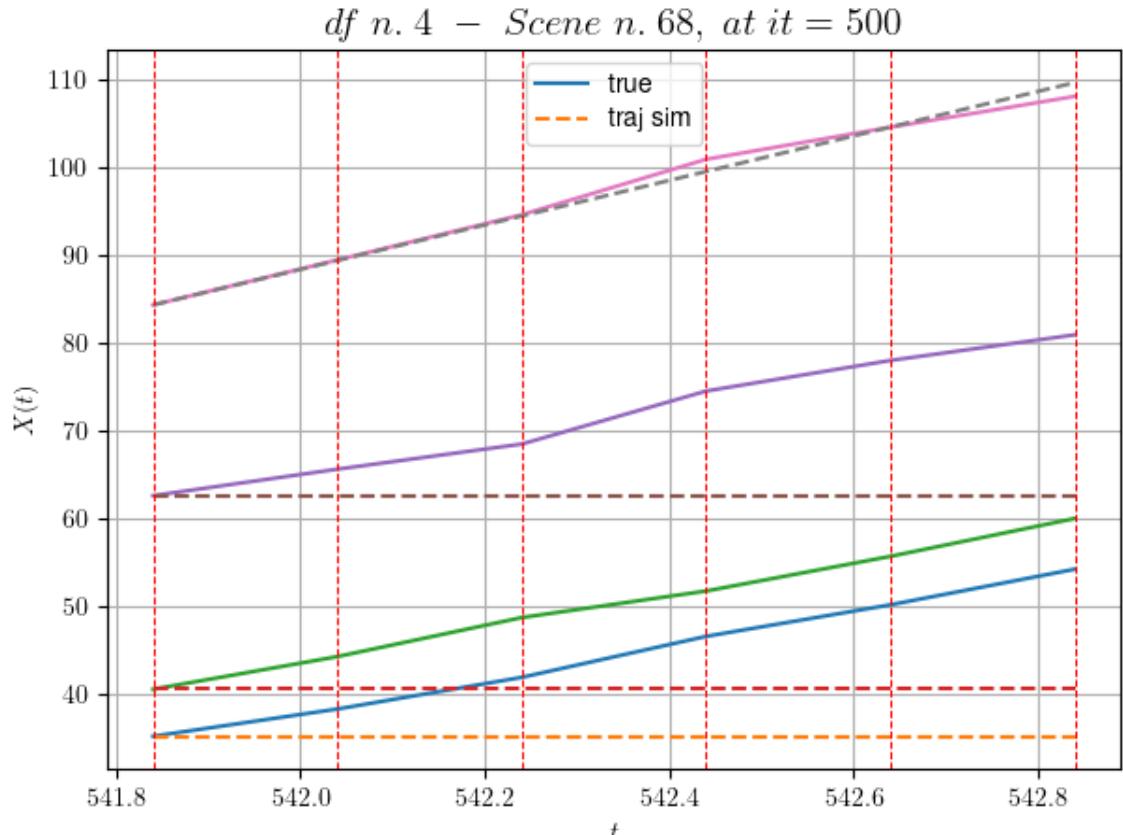
We have 3 time intervals inside [313.84,314.44]



For scene 20/46:
* After LR finder: LR_NN=0.0005 with mse=10.024197271277751
at it=24
* v0 = 26.41555928463834
* MSE = 57.55679887623677
* iterations = 450

DataFrame n.4. Scene n.21/46

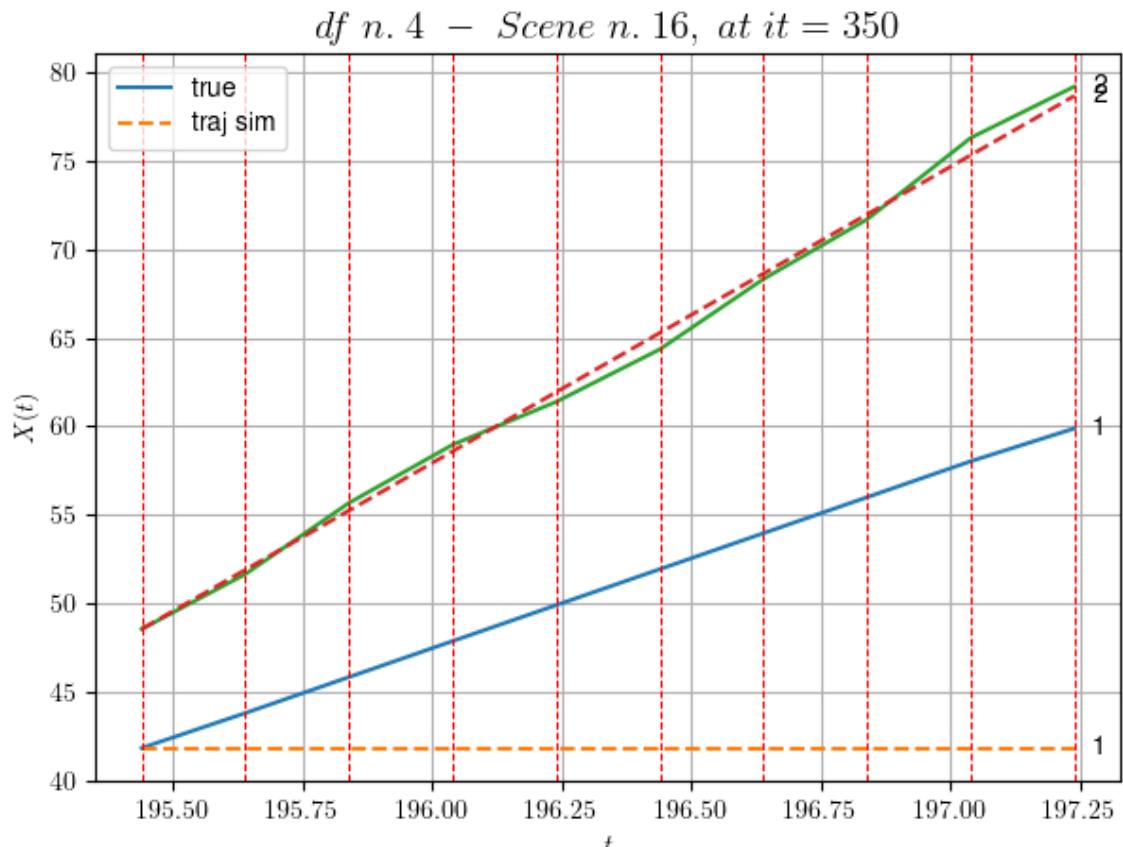
We have 5 time intervals inside [541.84,542.84]



For scene 21/46:
* After LR finder: LR_NN=0.001 with mse=17.620651734639495
at it=24
* v0 = 25.311591600962796
* MSE = 97.58186289766866
* iterations = 500

DataFrame n.4. Scene n.22/46

We have 9 time intervals inside [195.44,197.24]

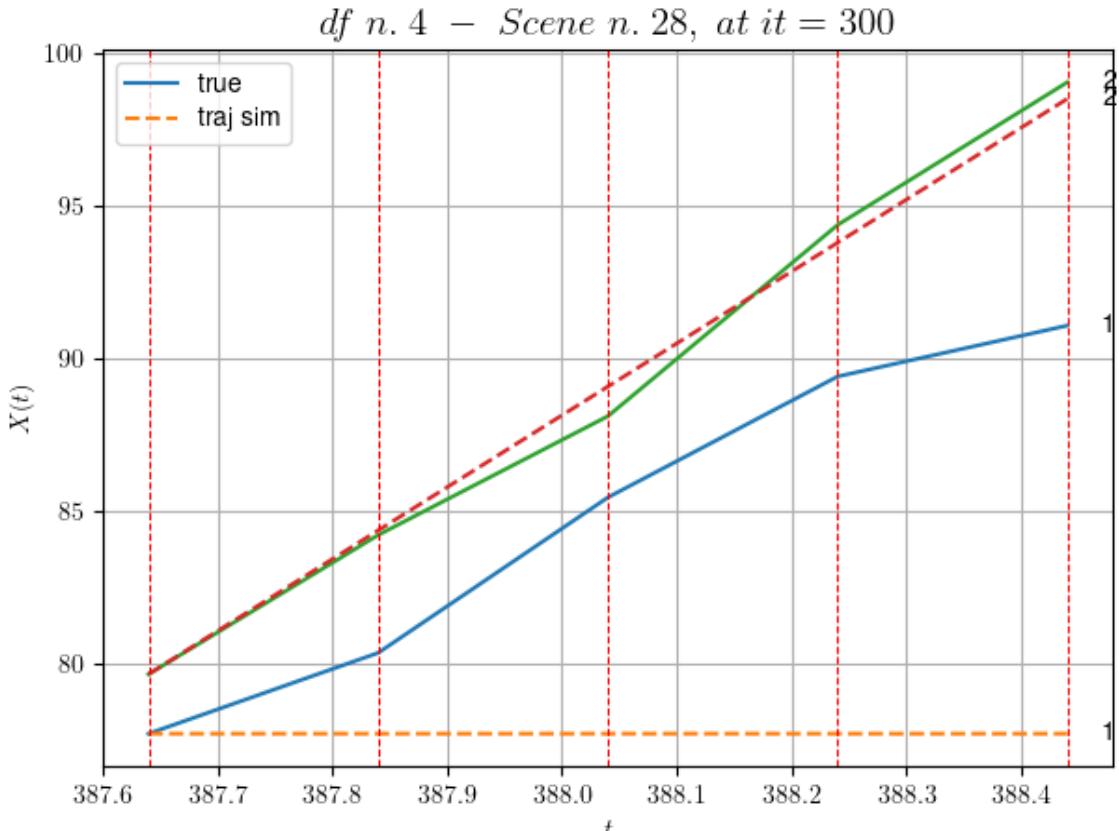


For scene 22/46:

* After LR finder: LR_NN=0.0005 with mse=101.49463407109069
at it=24
* v0 = 16.738443363469504
* MSE = 58.15656861042583
* iterations = 350

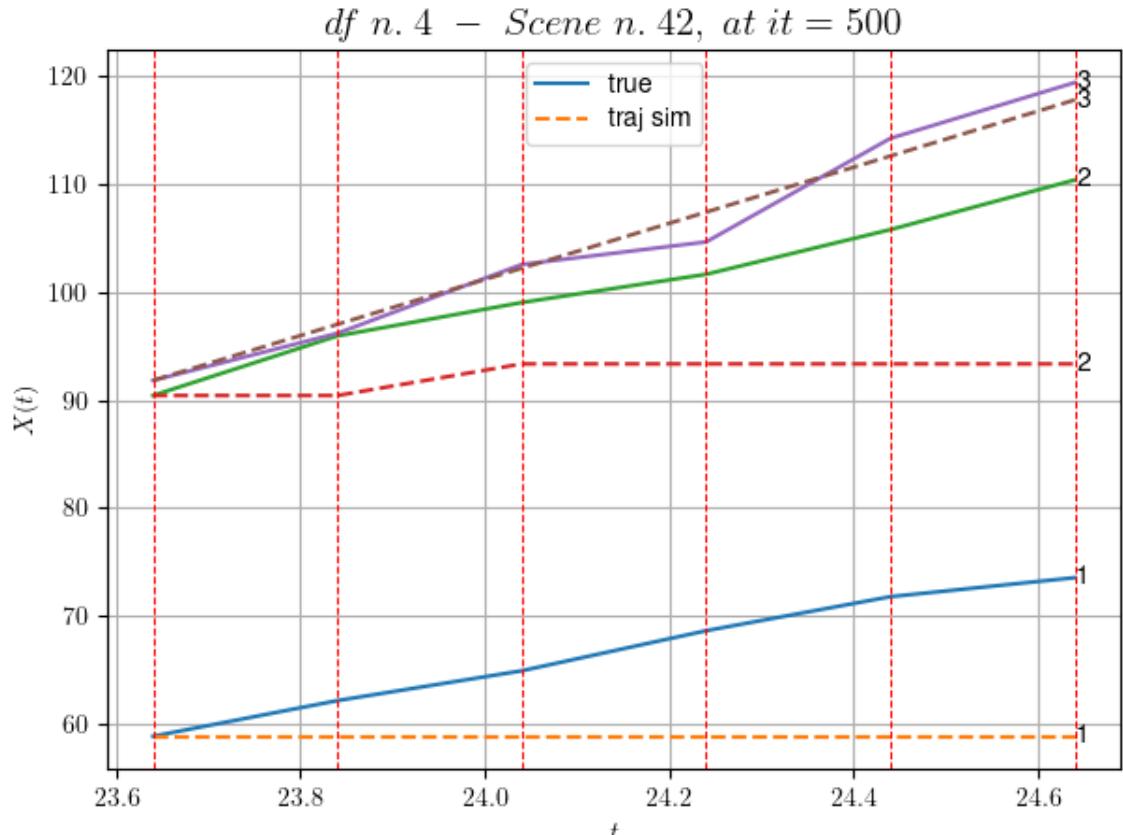
DataFrame n.4. Scene n.23/46

We have 4 time intervals inside [387.64,388.44]



DataFrame n.4. Scene n.24/46

We have 5 time intervals inside [23.64,24.64]

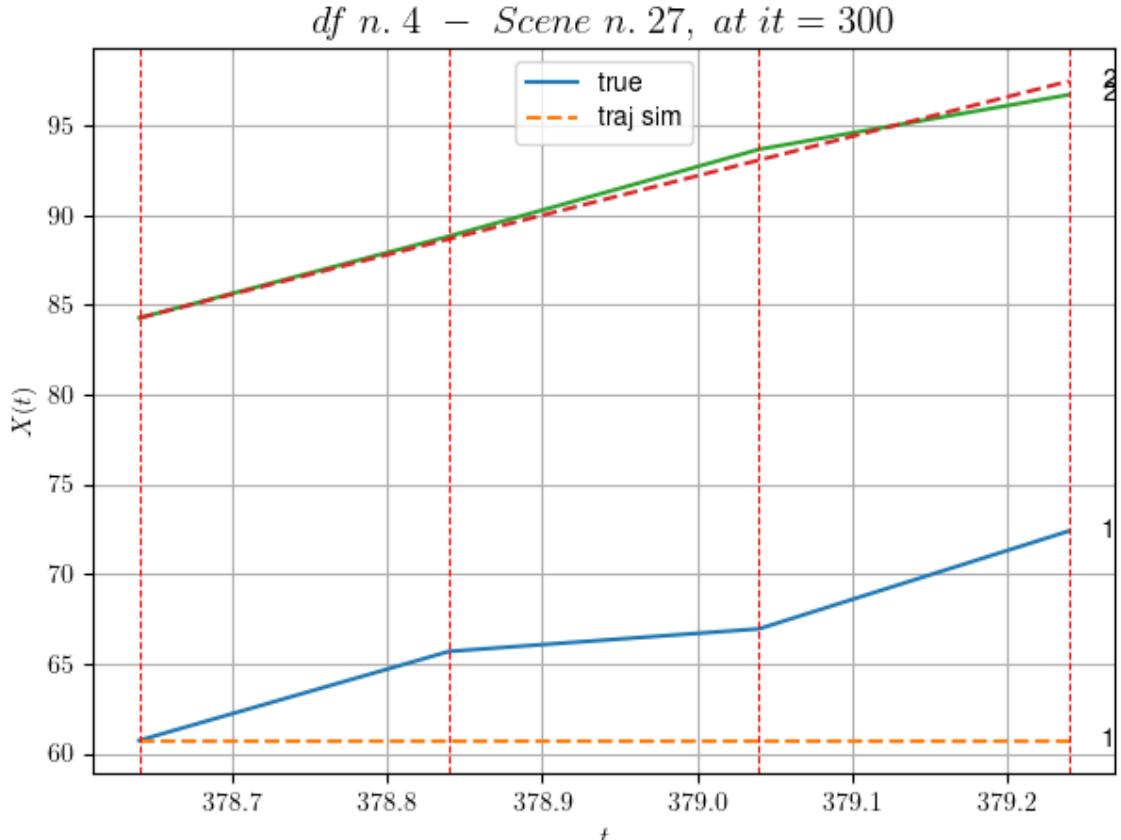


For scene 24/46:

- * After LR finder: LR_NN=0.001 with mse=20.803293622904174
- at it=24
- * v0 = 25.97457555941861
- * MSE = 61.98035940089568
- * iterations = 500

DataFrame n.4. Scene n.25/46

We have 3 time intervals inside [378.64,379.24]

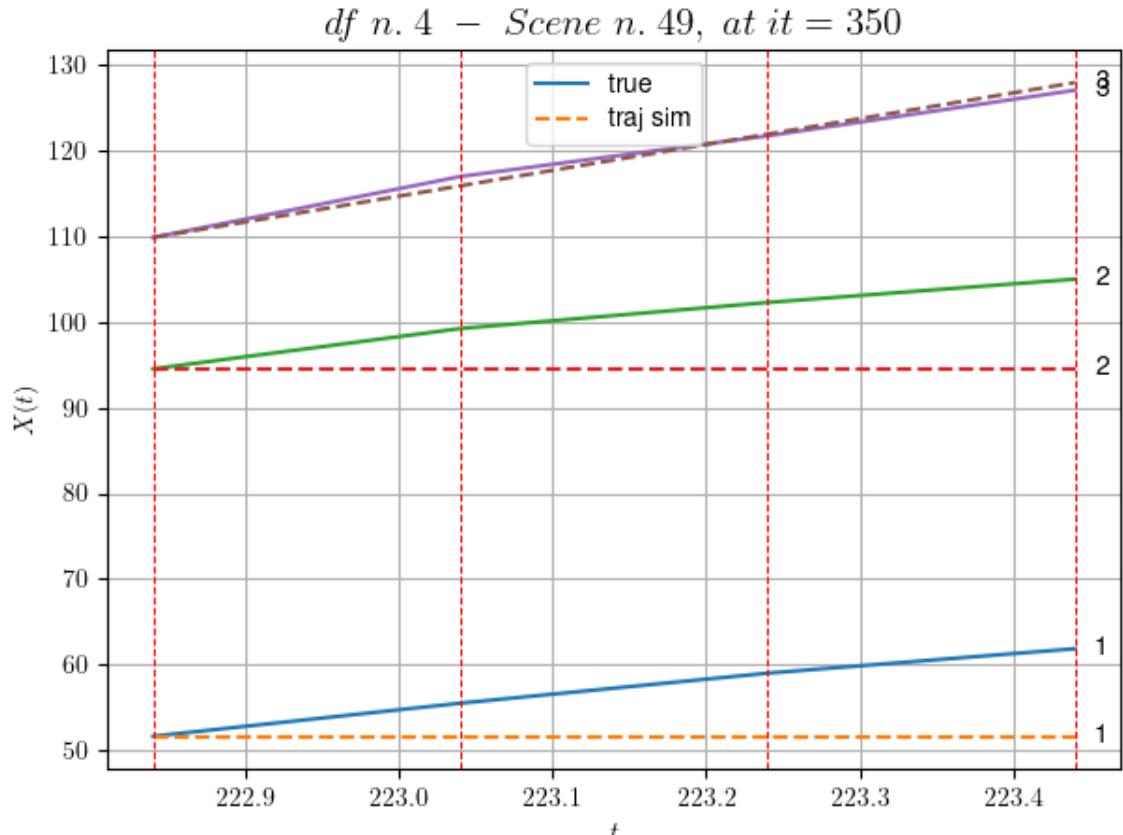


For scene 25/46:

- * After LR finder: $\text{LR_NN}=5\text{e-}05$ with $\text{mse}=5.41232509552698$ at $\text{it}=24$
 - * $v_0 = 21.986684199236866$
 - * $\text{MSE} = 25.031814834881573$
 - * iterations = 300
-

DataFrame n.4. Scene n.26/46

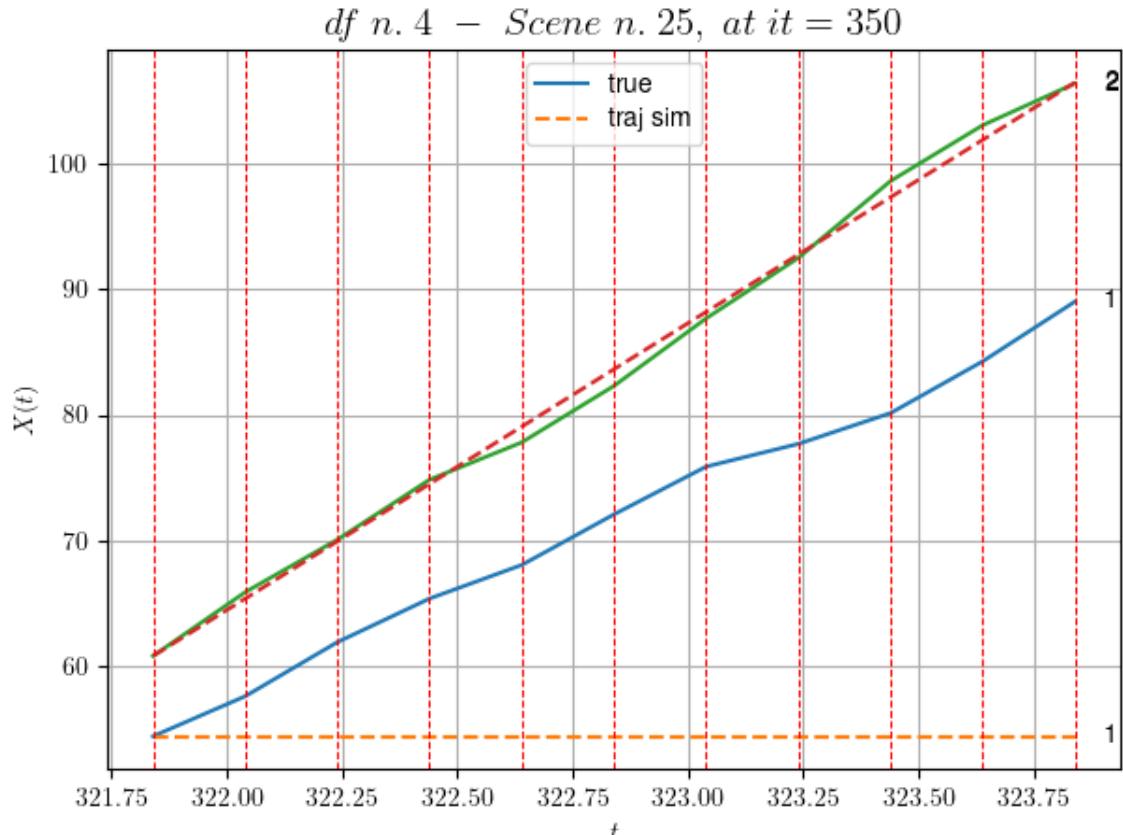
We have 3 time intervals inside [222.84, 223.44]



For scene 26/46:
* After LR finder: LR_NN=5e-05 with mse=5.322004557196212 at it=24
* v0 = 30.107927882855805
* MSE = 30.51618156307838
* iterations = 350

DataFrame n.4. Scene n.27/46

We have 10 time intervals inside [321.84, 323.84]

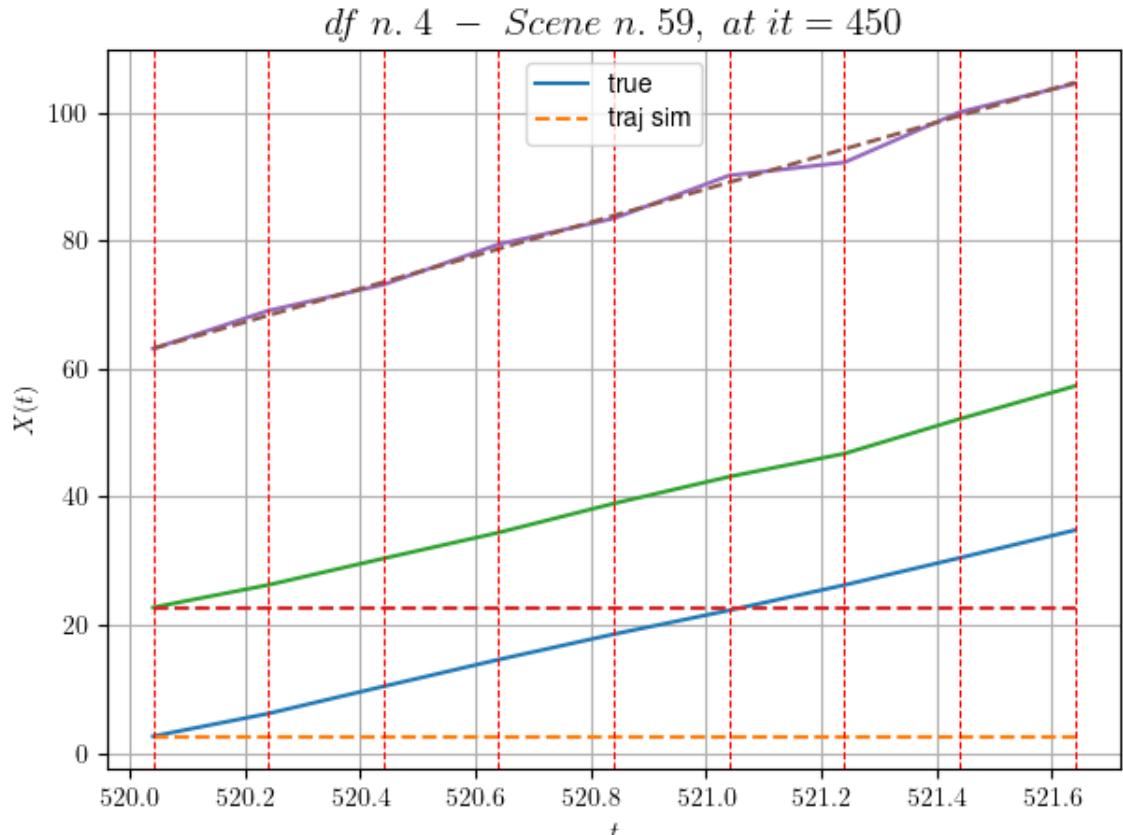


For scene 27/46:

```
For scene 27/46:  
* After LR finder: LR_NN=0.001 with mse=37.47426857478562 a  
t it=24  
* v0 = 22.810097854317167  
* MSE = 201.70579069991987  
* iterations = 350
```

DataFrame n.4. Scene n.28/46

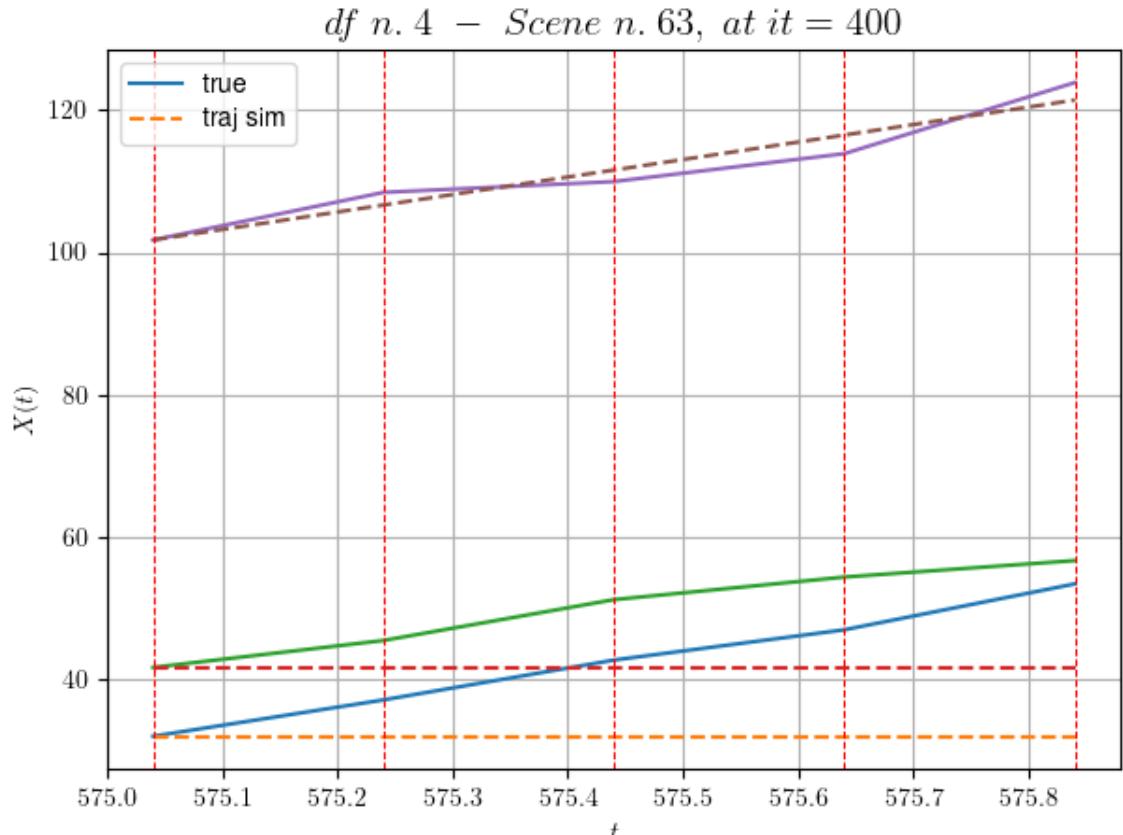
We have 8 time intervals inside [520.04,521.64]



For scene 28/46:
* After LR finder: LR_NN=5e-05 with mse=30.205231180516744
at it=24
* v0 = 25.96280813487443
* MSE = 250.12883397453743
* iterations = 450

DataFrame n.4. Scene n.29/46

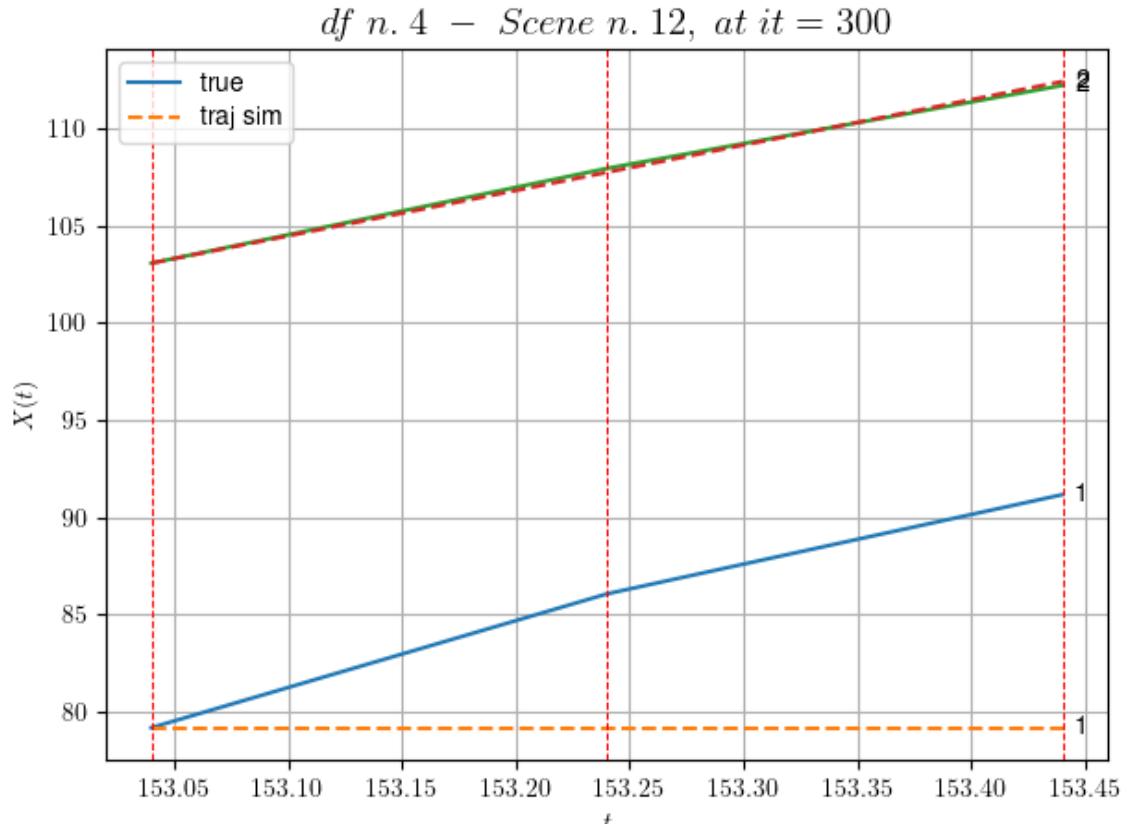
We have 4 time intervals inside [575.04,575.84]



For scene 29/46:
* After LR finder: LR_NN=0.0005 with mse=46.221671394150434
at it=24
* v0 = 24.54562854259818
* MSE = 88.63487362277759
* iterations = 400

DataFrame n.4. Scene n.30/46

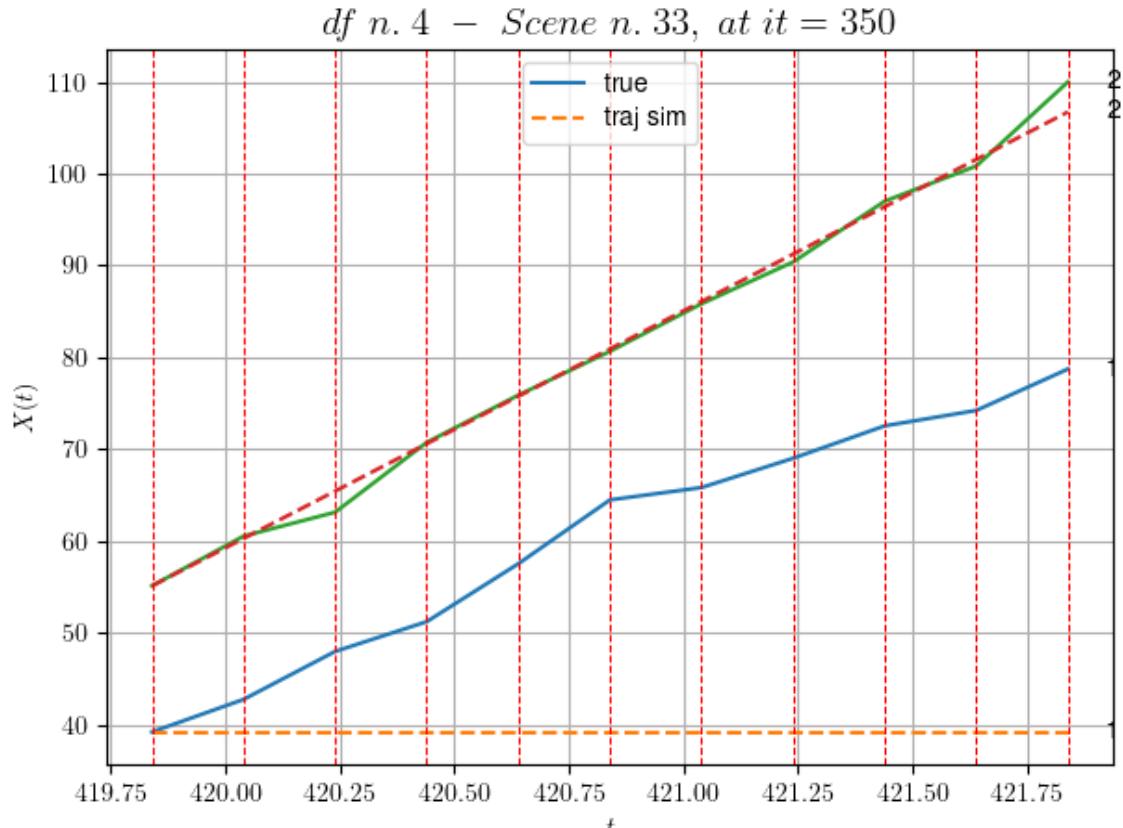
We have 2 time intervals inside [153.04,153.44]



For scene 30/46:
* After LR finder: LR_NN=0.0001 with mse=1.6461187889897162
at it=24
* v0 = 23.385110493515334
* MSE = 31.909373891119195
* iterations = 300

DataFrame n.4. Scene n.31/46

We have 10 time intervals inside [419.84,421.84]

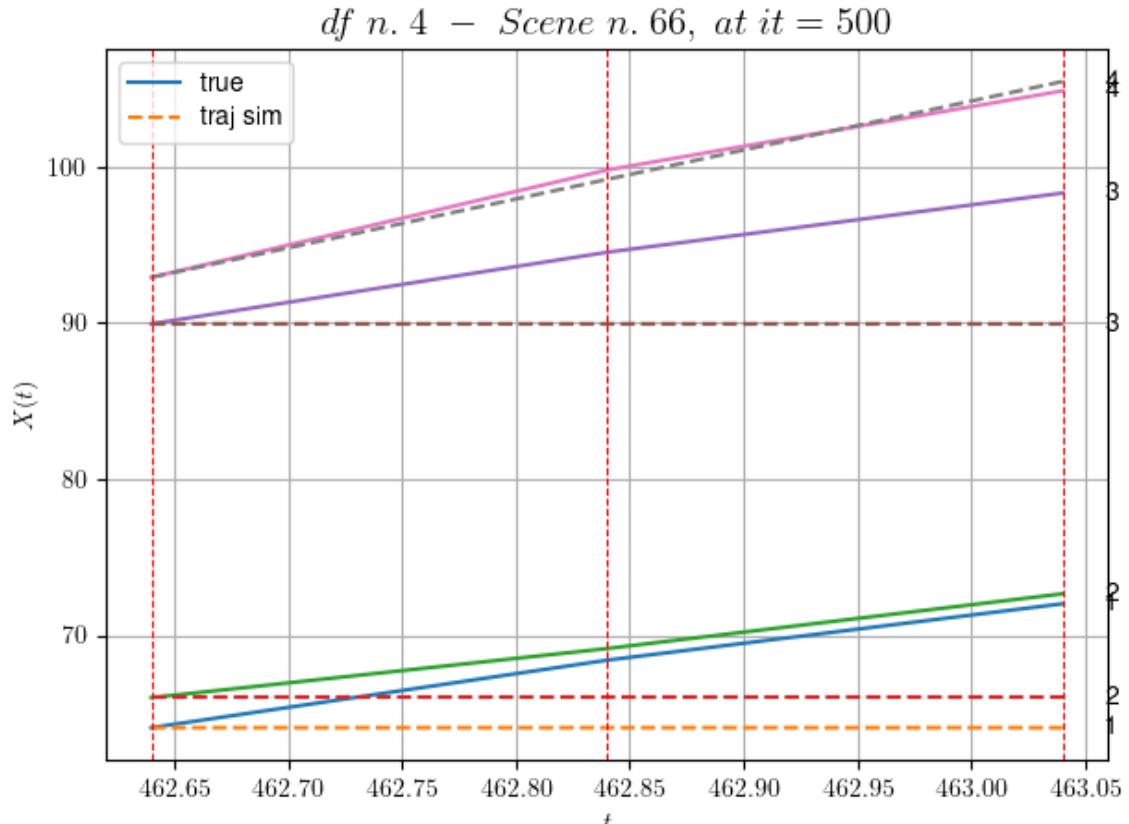


For scene 31/46:

* After LR finder: LR_NN=0.0005 with mse=15.648828057340626
at it=24
* v0 = 25.806420297021862
* MSE = 305.5883172487465
* iterations = 350

DataFrame n.4. Scene n.32/46

We have 2 time intervals inside [462.64,463.04]

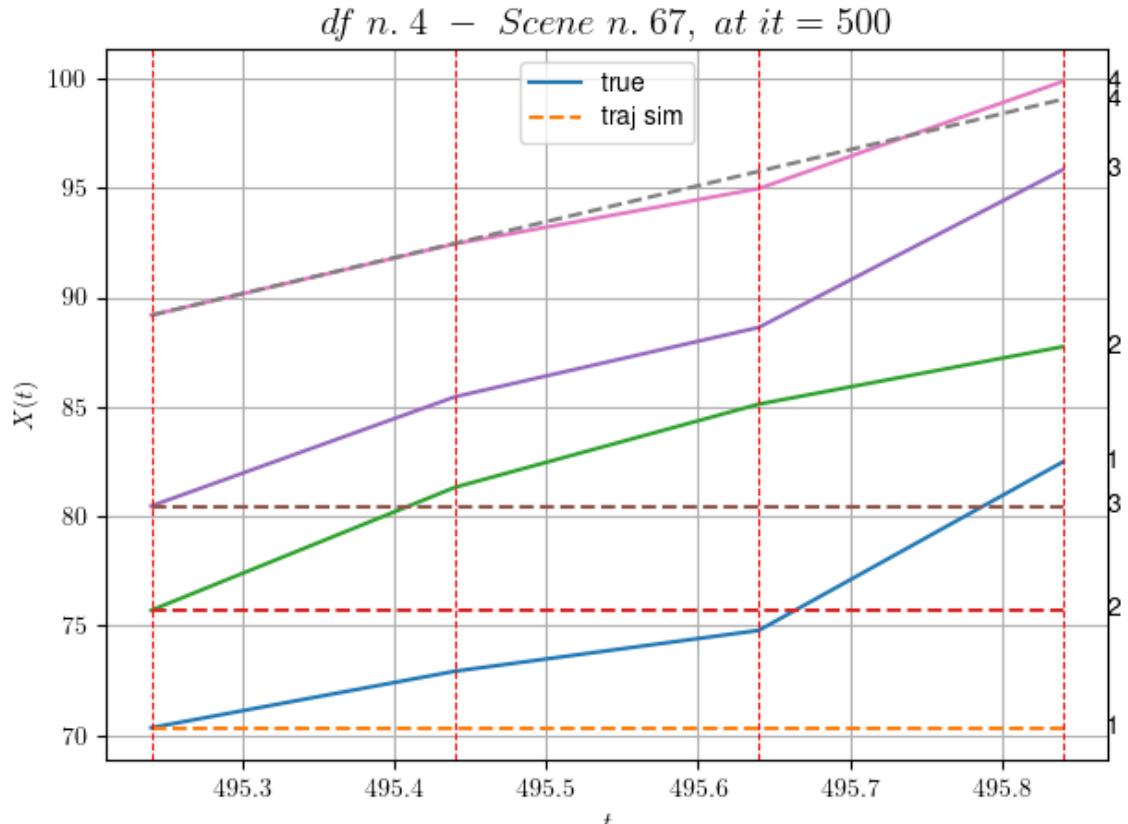


For scene 32/46:

* After LR finder: LR_NN=0.001 with mse=7.425510920889093 at it=24
* v0 = 31.352447205664888
* MSE = 18.95473938297995
* iterations = 500

DataFrame n.4. Scene n.33/46

We have 3 time intervals inside [495.24, 495.84]

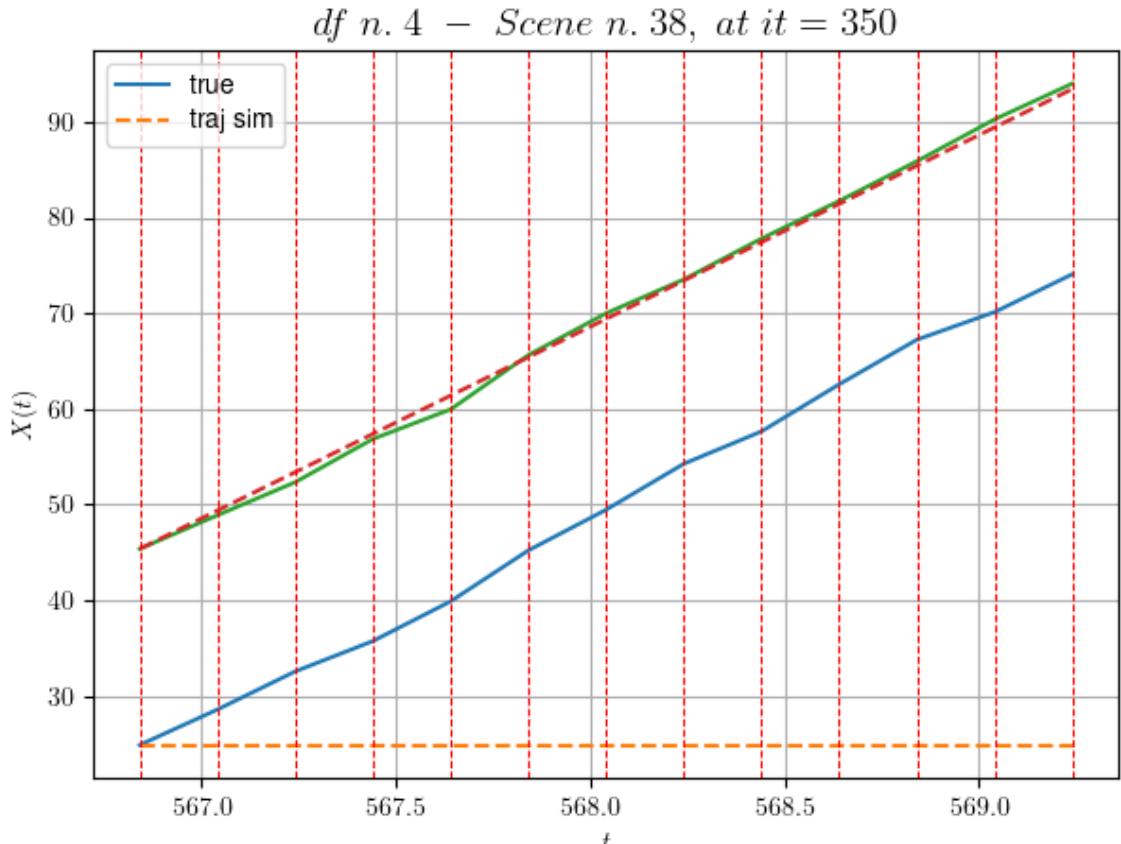


For scene 33/46:

* After LR finder: LR_NN=0.0005 with mse=10.475590269153507
at it=24
* v0 = 16.43780548223582
* MSE = 47.994699889347835
* iterations = 500

DataFrame n.4. Scene n.34/46

We have 12 time intervals inside [566.84, 569.24]



For scene 34/46:

* After LR finder: LR_NN=0.0001 with mse=96.51840275751455

at it=24

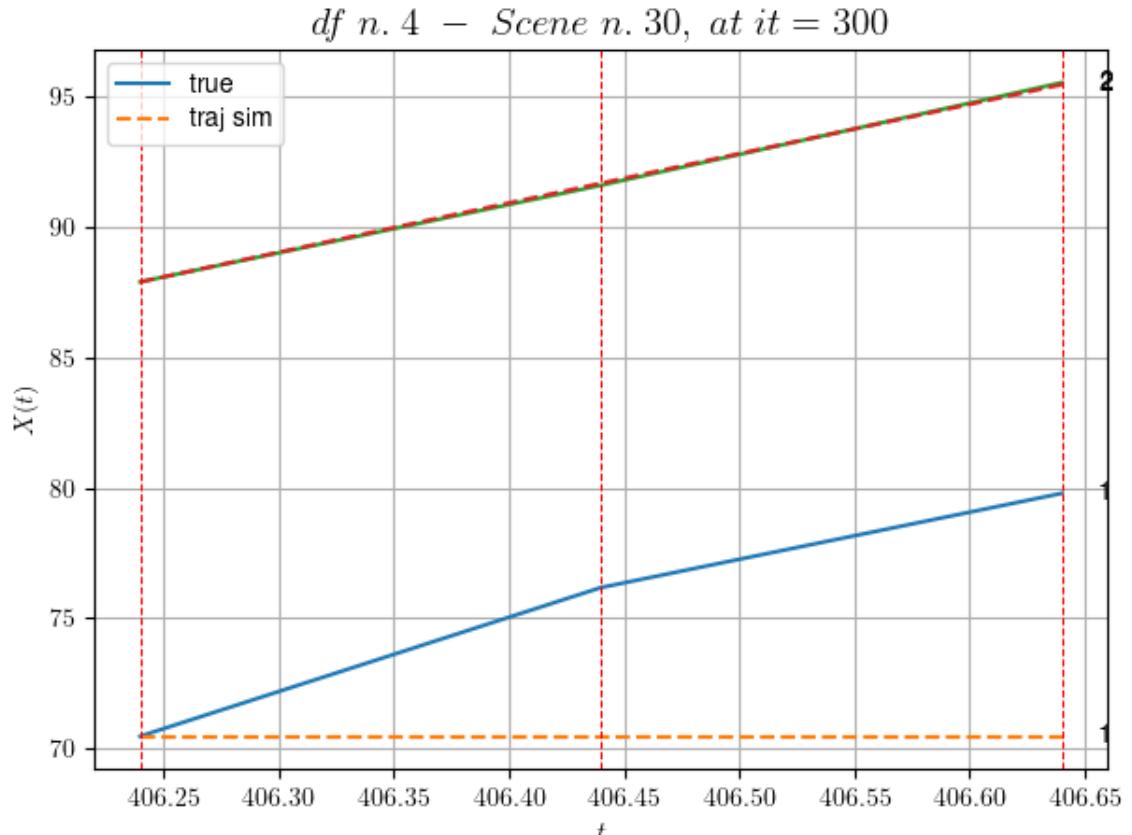
* v0 = 20.028487749730772

* MSE = 425.4613300718906

* iterations = 350

DataFrame n.4. Scene n.35/46

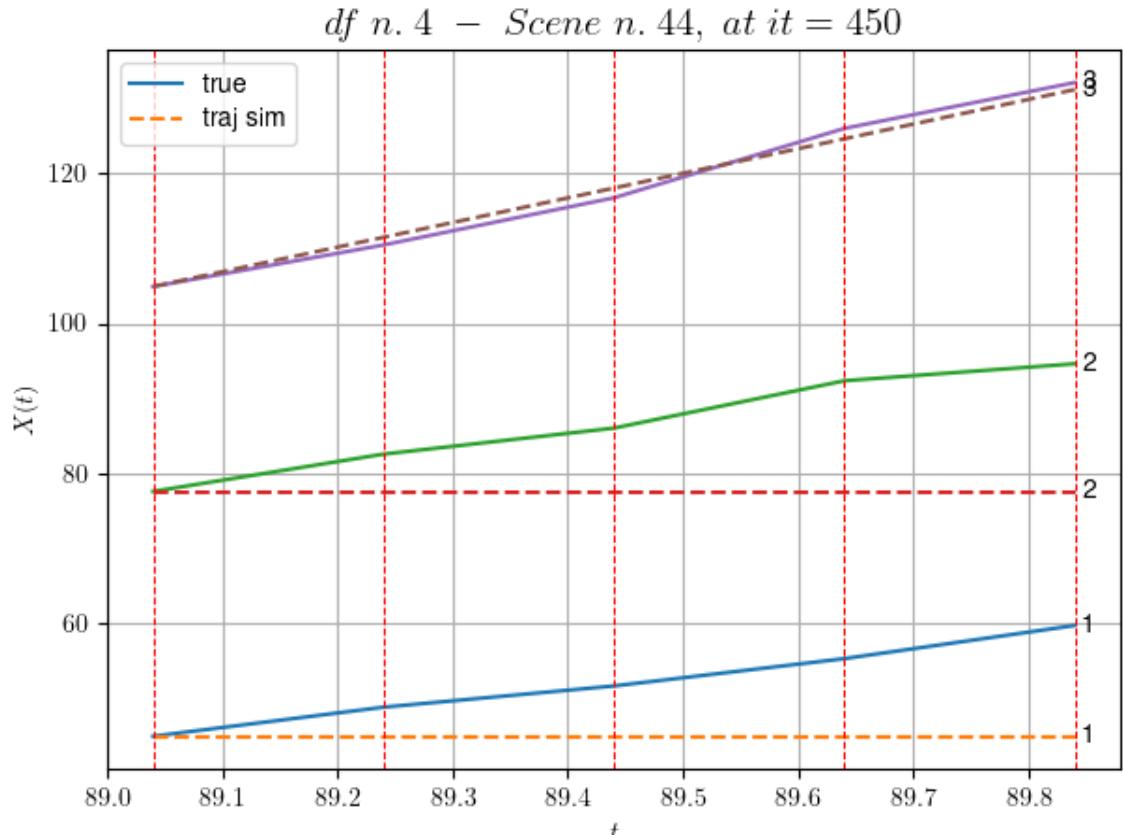
We have 2 time intervals inside [406.24,406.64]



For scene 35/46:
* After LR finder: LR_NN=0.0001 with mse=4.133842498375924
at it=24
* v0 = 18.926521960384417
* MSE = 19.899559183035237
* iterations = 300

DataFrame n.4. Scene n.36/46

We have 4 time intervals inside [89.04,89.84]

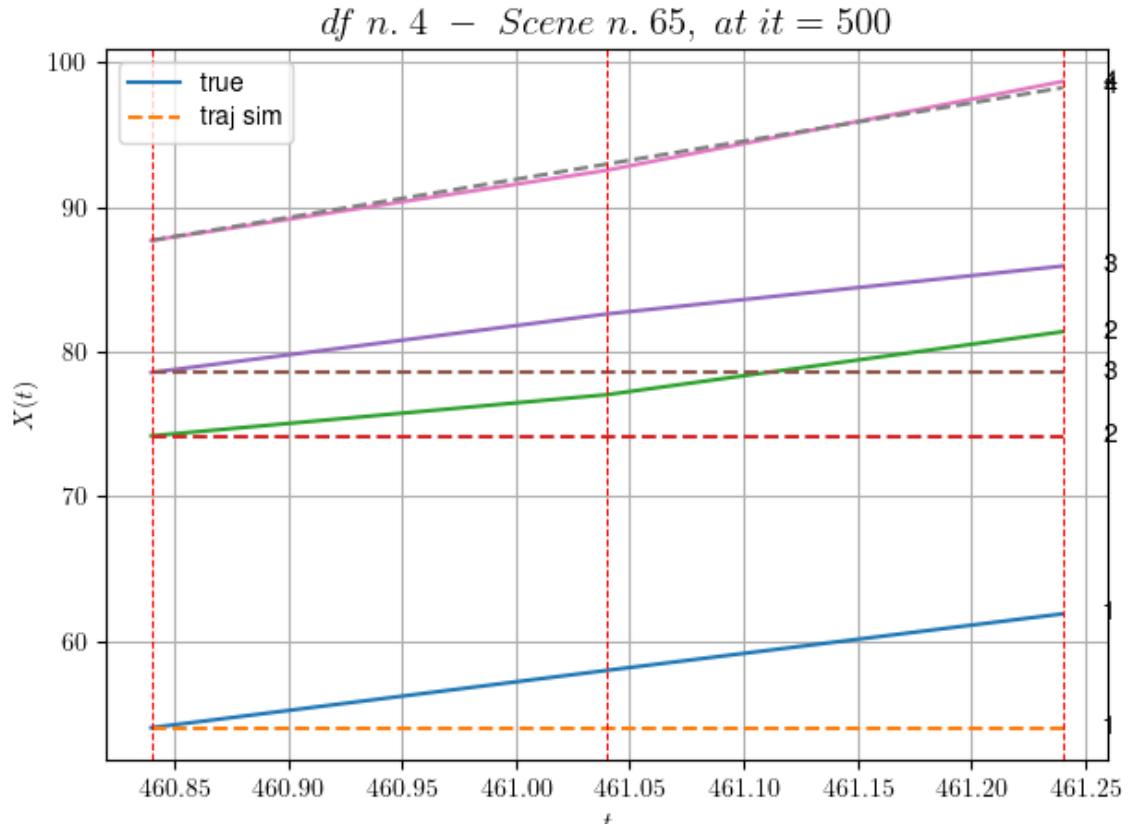


For scene 36/46:

* After LR finder: LR_NN=5e-05 with mse=4.021599234590648 at it=24
* v0 = 32.775431077338745
* MSE = 66.0526786859791
* iterations = 450

DataFrame n.4. Scene n.37/46

We have 2 time intervals inside [460.84, 461.24]

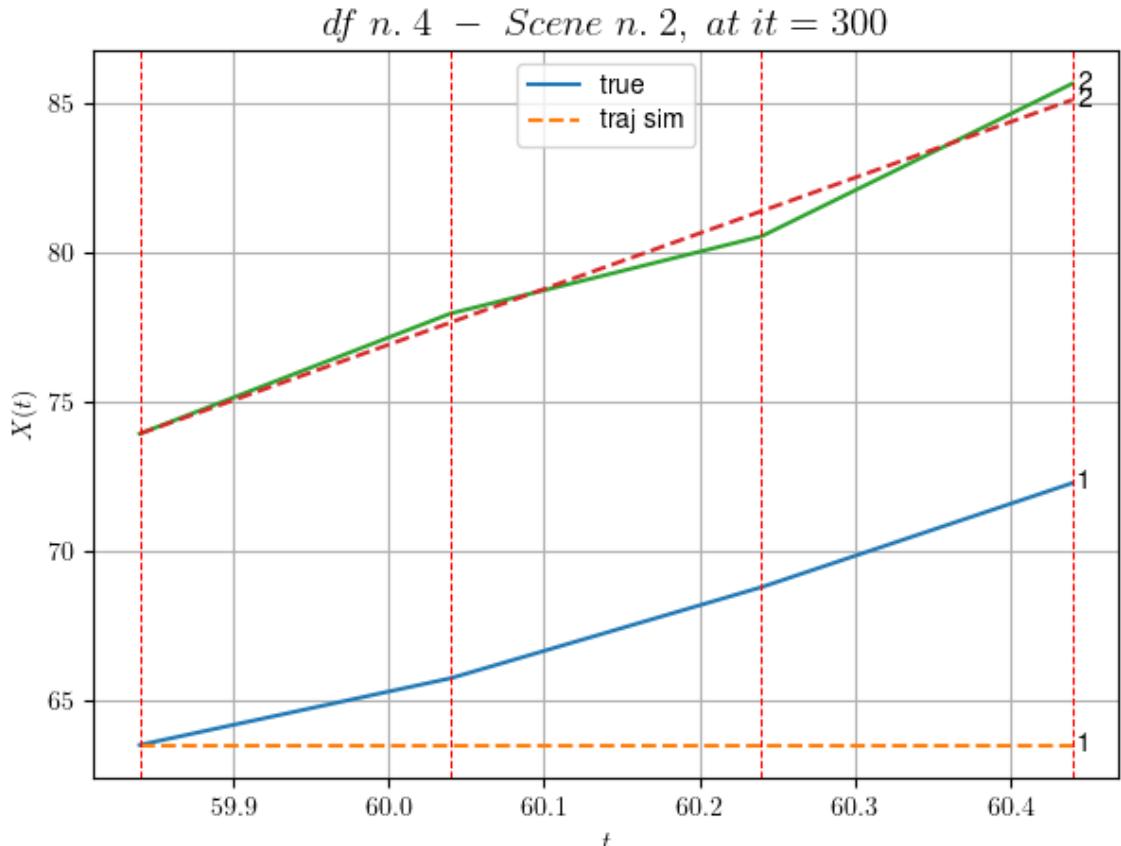


For scene 37/46:

* After LR finder: LR_NN=0.0005 with mse=3.094829106981166
at it=24
* v0 = 26.404314529227783
* MSE = 17.373066287818155
* iterations = 500

DataFrame n.4. Scene n.38/46

We have 3 time intervals inside [59.84,60.44]

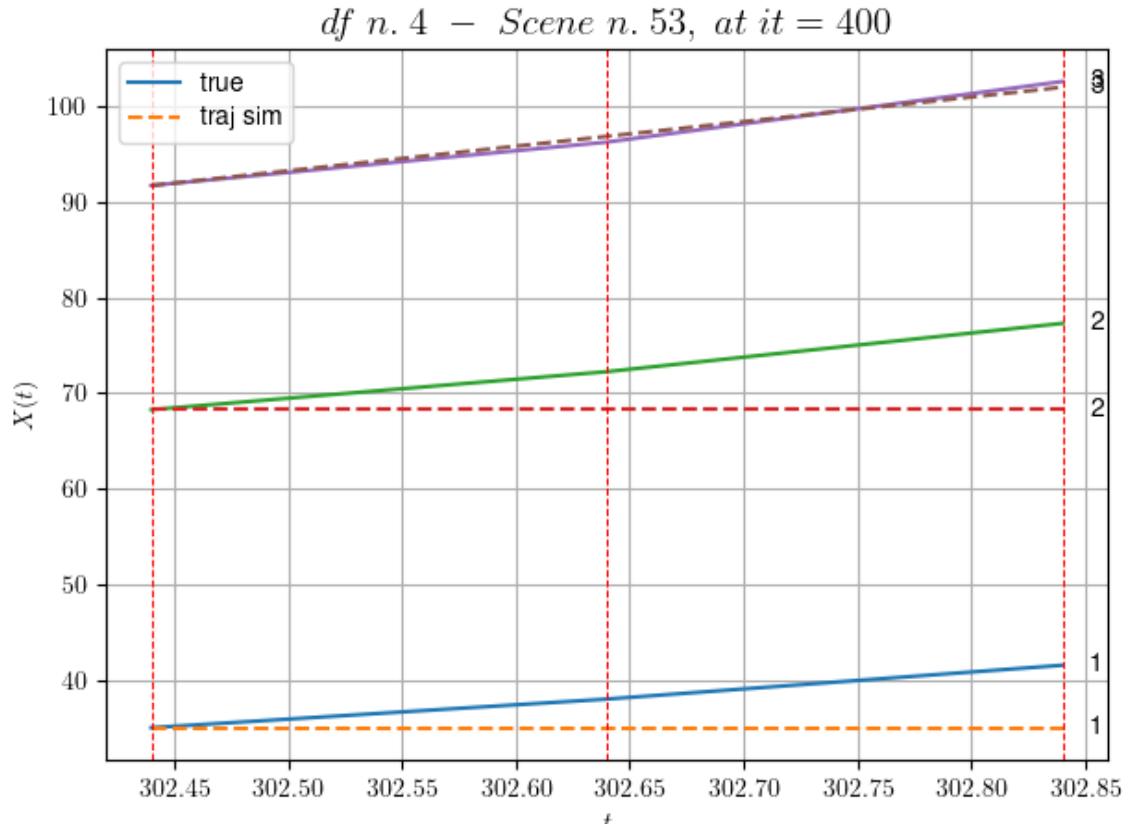


For scene 38/46:

* After LR finder: LR_NN=0.0001 with mse=9.10982087799471 at it=24
* v0 = 18.625520758002853
* MSE = 13.847472476065857
* iterations = 300

DataFrame n.4. Scene n.39/46

We have 2 time intervals inside [302.44,302.84]

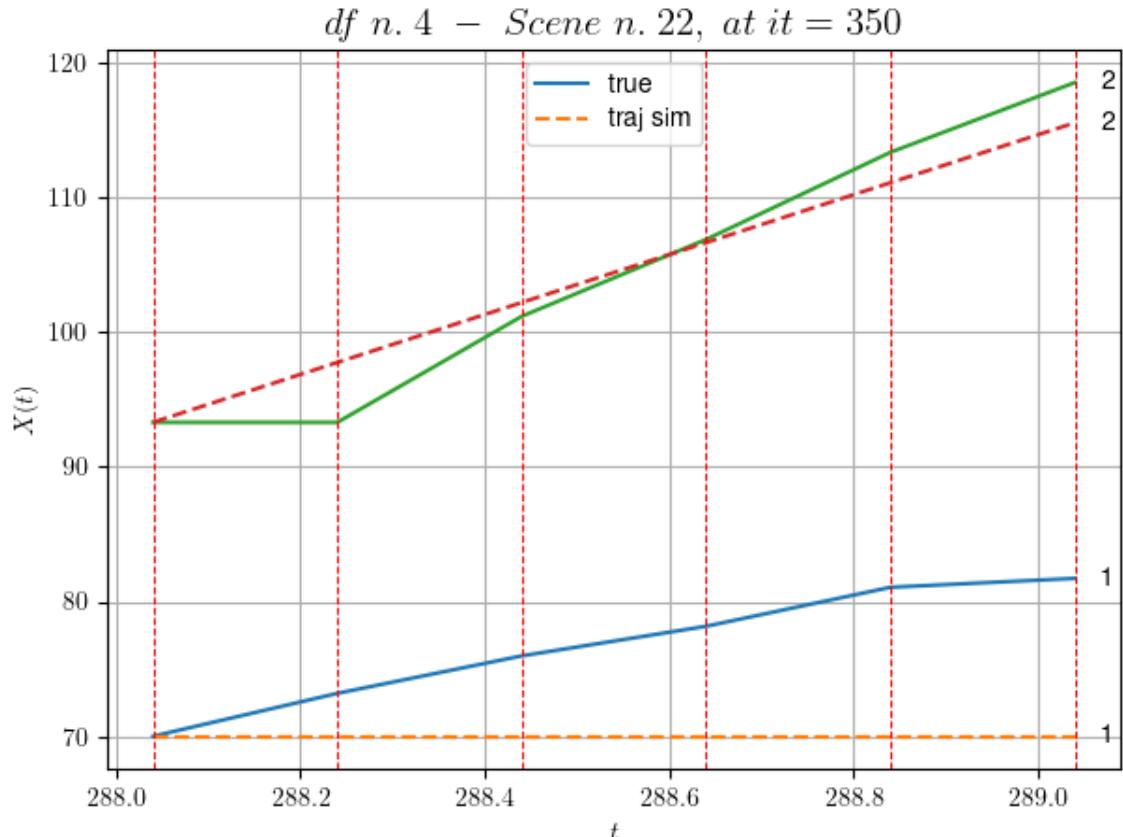


For scene 39/46:

* After LR finder: LR_NN=5e-05 with mse=2.093115024294395 at it=24
* v0 = 25.744543721832738
* MSE = 16.674743607720448
* iterations = 400

DataFrame n.4. Scene n.40/46

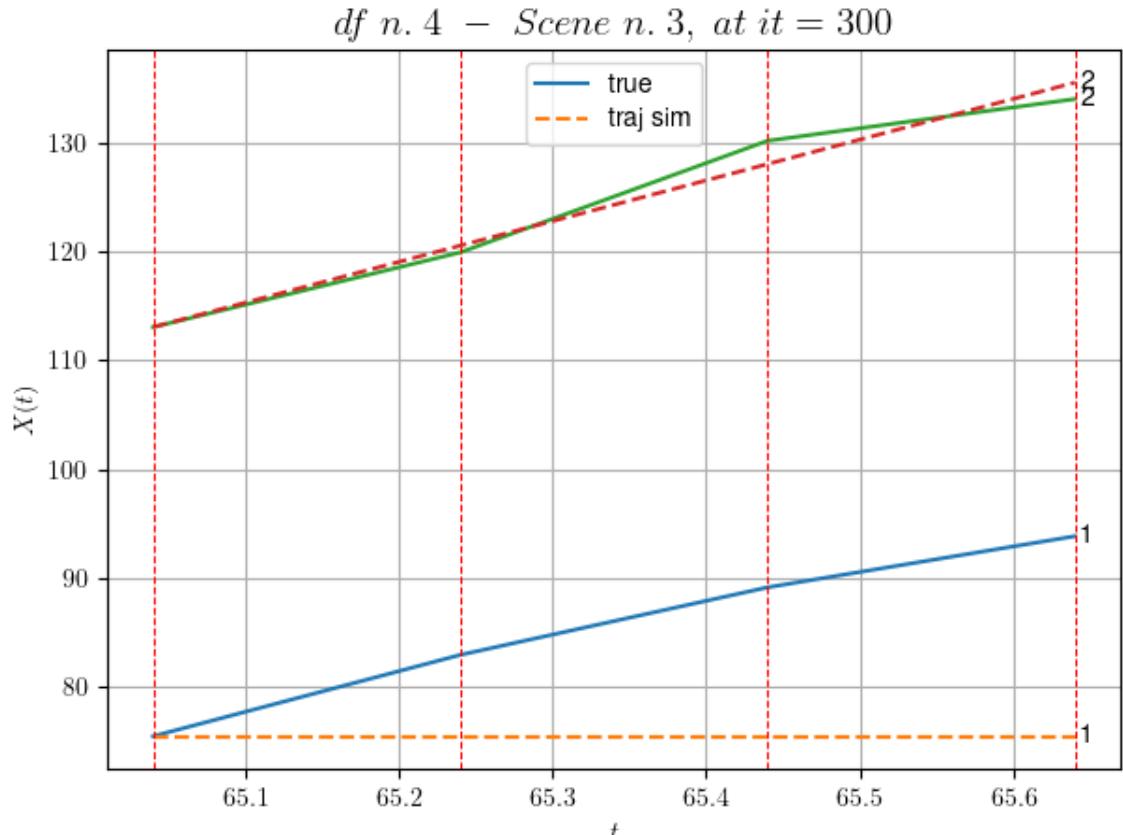
We have 5 time intervals inside [288.04, 289.04]



For scene 40/46:
* After LR finder: LR_NN=5e-05 with mse=11.297180329713658
at it=24
* v0 = 22.247899845553825
* MSE = 33.440222126650866
* iterations = 350

DataFrame n.4. Scene n.41/46

We have 3 time intervals inside [65.04,65.64]

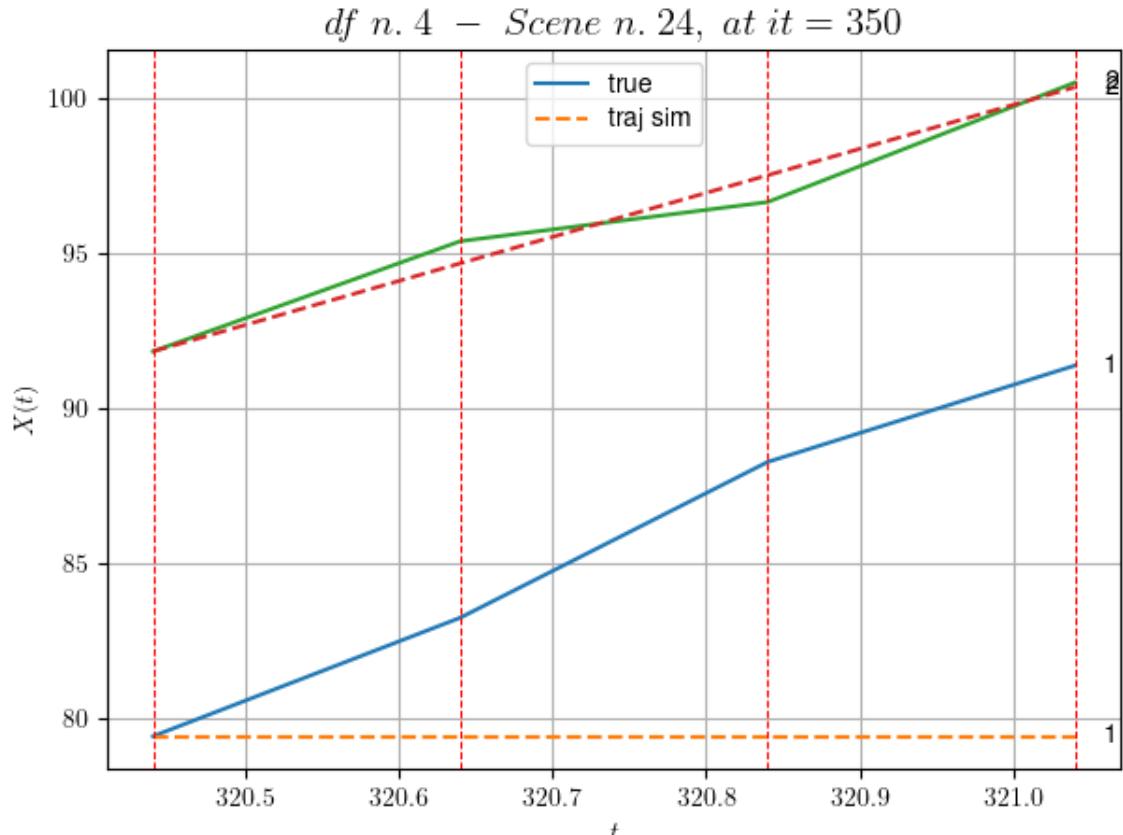


For scene 41/46:

- * After LR finder: LR_NN=5e-05 with mse=5.493377353200364 at it=24
- * v0 = 37.41903580082959
- * MSE = 73.35142096437883
- * iterations = 300

DataFrame n.4. Scene n.42/46

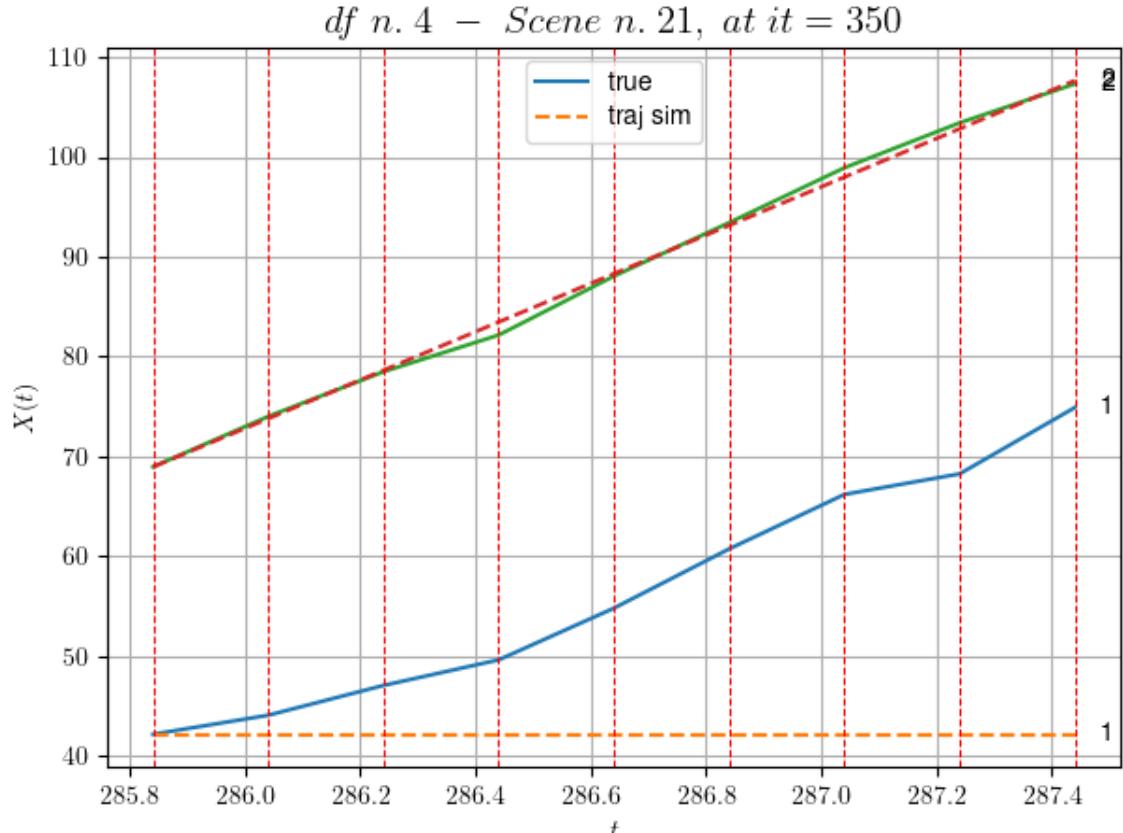
We have 3 time intervals inside [320.44,321.04]



For scene 42/46:
* After LR finder: LR_NN=0.0001 with mse=18.223901266095048
at it=24
* v0 = 14.162426915083142
* MSE = 29.474486837440697
* iterations = 350

DataFrame n.4. Scene n.43/46

We have 8 time intervals inside [285.84,287.44]

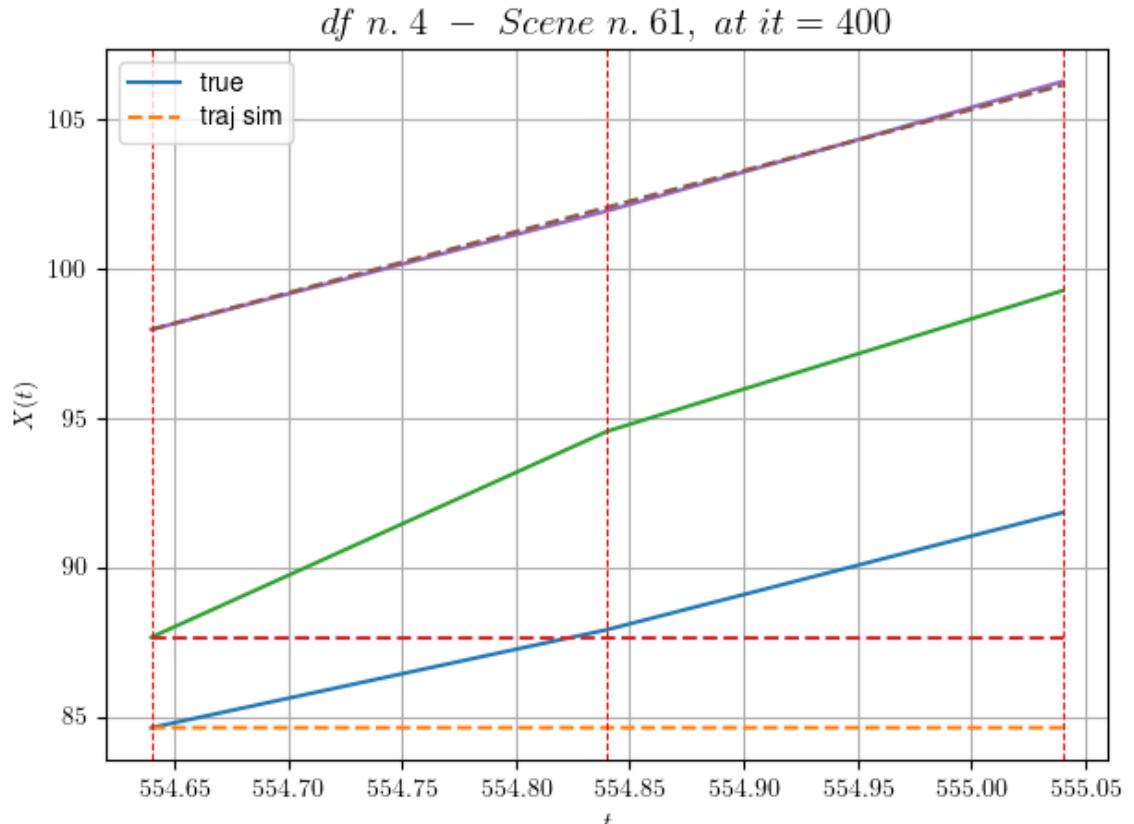


For scene 43/46:

* After LR finder: LR_NN=0.0005 with mse=16.465709803945636
at it=24
* v0 = 24.201830944838626
* MSE = 162.37106305600489
* iterations = 350

DataFrame n.4. Scene n.44/46

We have 2 time intervals inside [554.64,555.04]

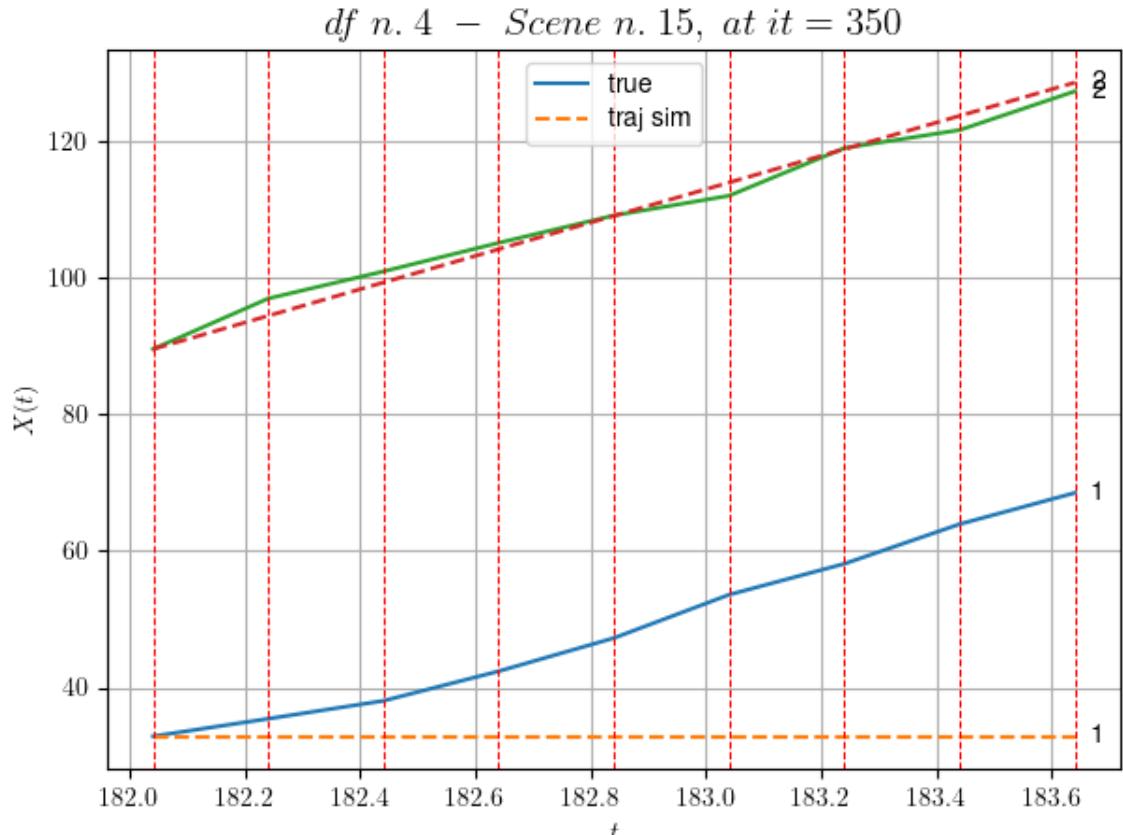


For scene 44/46:

* After LR finder: LR_NN=0.001 with mse=2.464566982062742 at it=24
* v0 = 20.44074014855796
* MSE = 27.154363716429586
* iterations = 400

DataFrame n.4. Scene n.45/46

We have 8 time intervals inside [182.04,183.64]

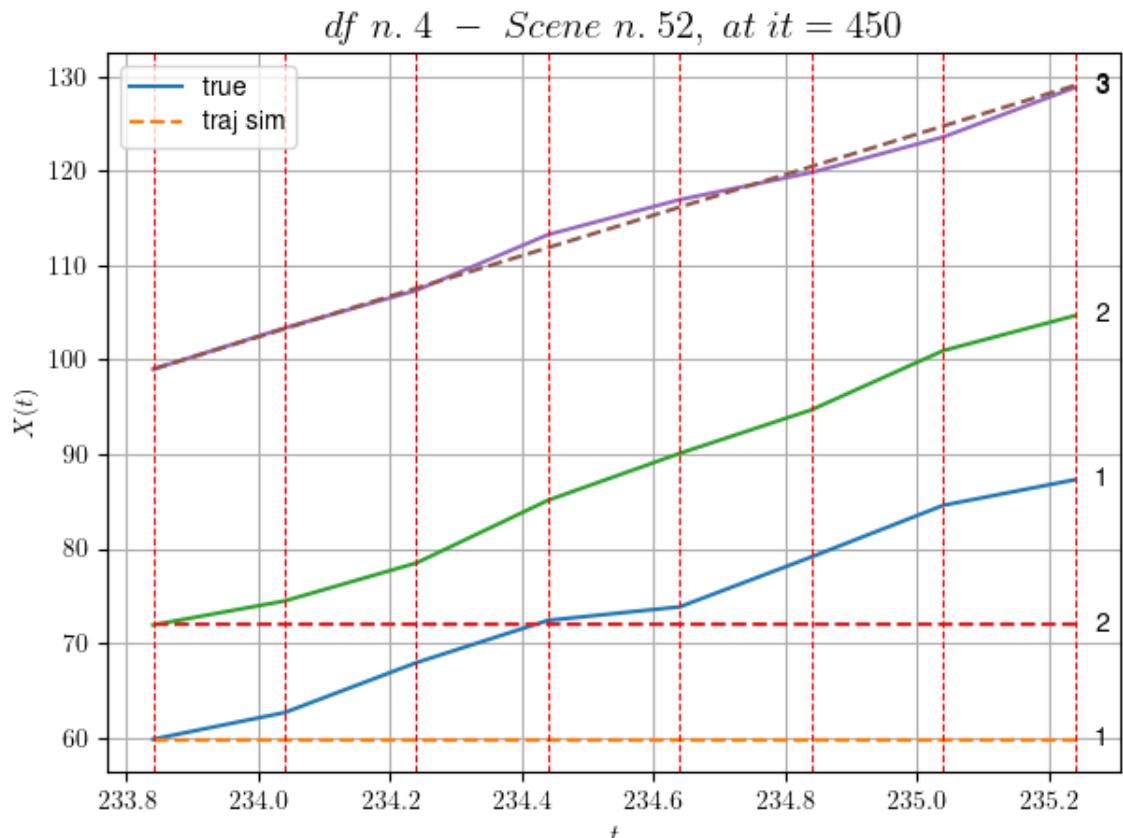


For scene 45/46:

- * After LR finder: LR_NN=5e-05 with mse=20.840362229983718
- at it=24
- * v0 = 24.38495352291918
- * MSE = 202.76868337175648
- * iterations = 350

DataFrame n.4. Scene n.46/46

We have 7 time intervals inside [233.84, 235.24]

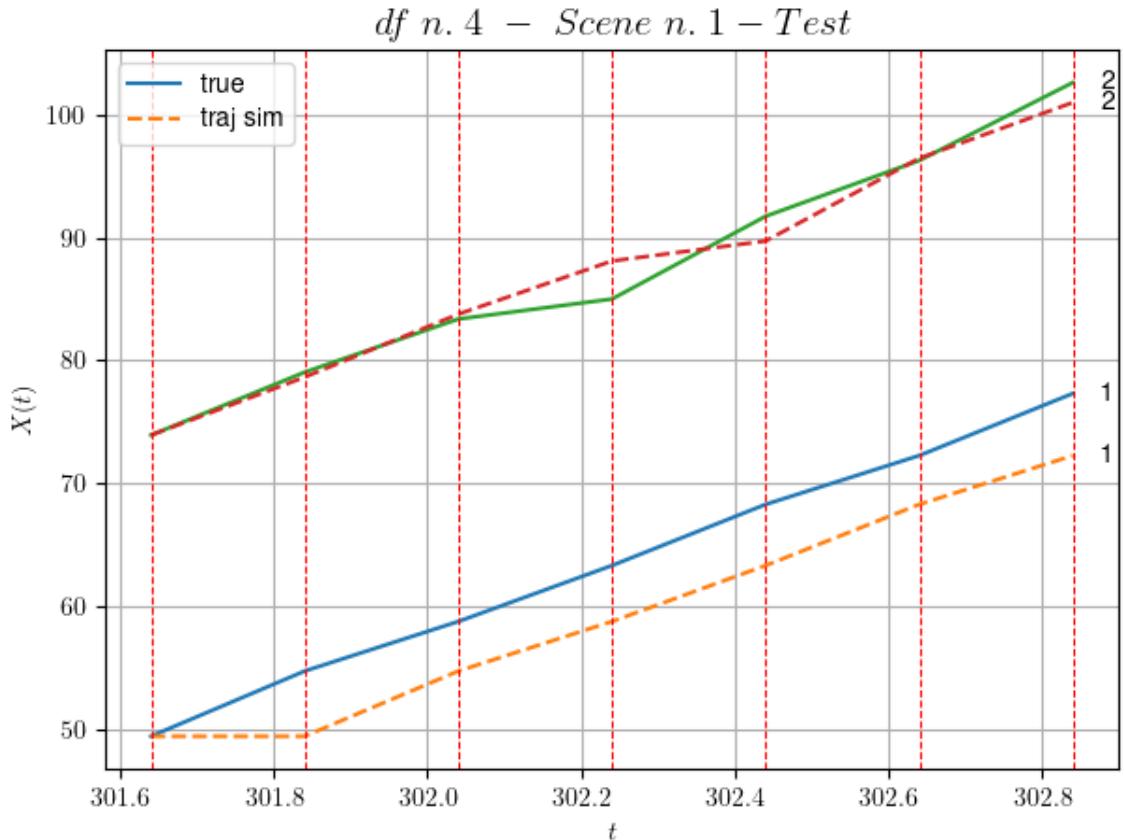


For scene 46/46:
* After LR finder: LR_NN=5e-05 with mse=32.242415381446435
at it=24
* v0 = 21.462808179972562
* MSE = 215.2936626937786
* iterations = 450

MSE train: 105.36962736884067

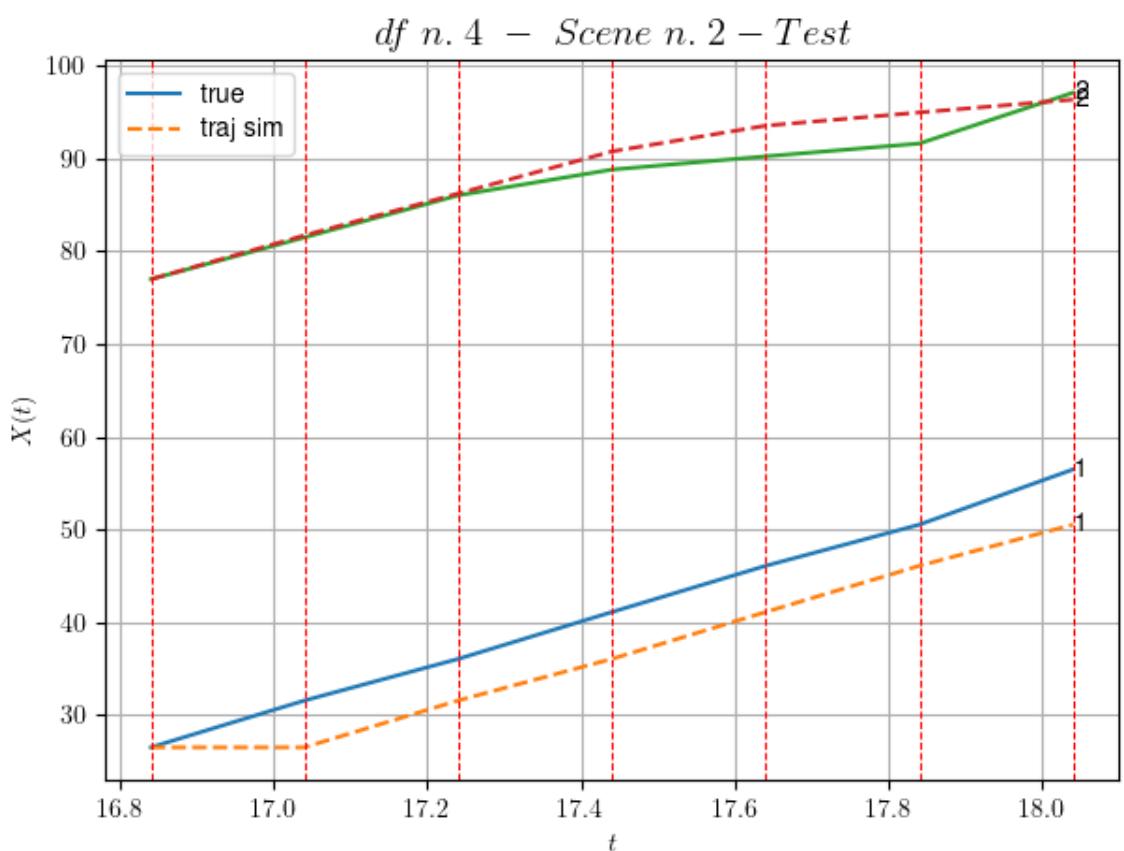
Testing step. (23 scenes)

DataFrame n.4. Scene n.1/23



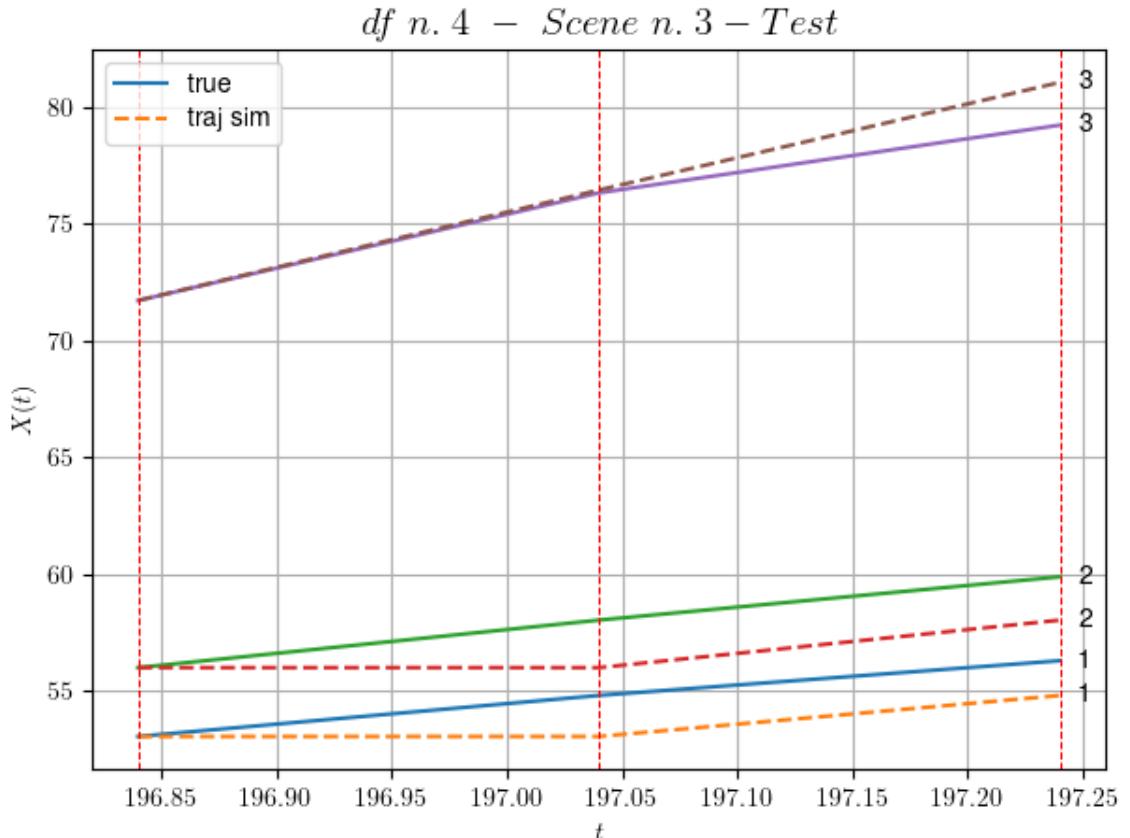
For scene 1/23:
* MSE = 10.588274895075756

DataFrame n.4. Scene n.2/23



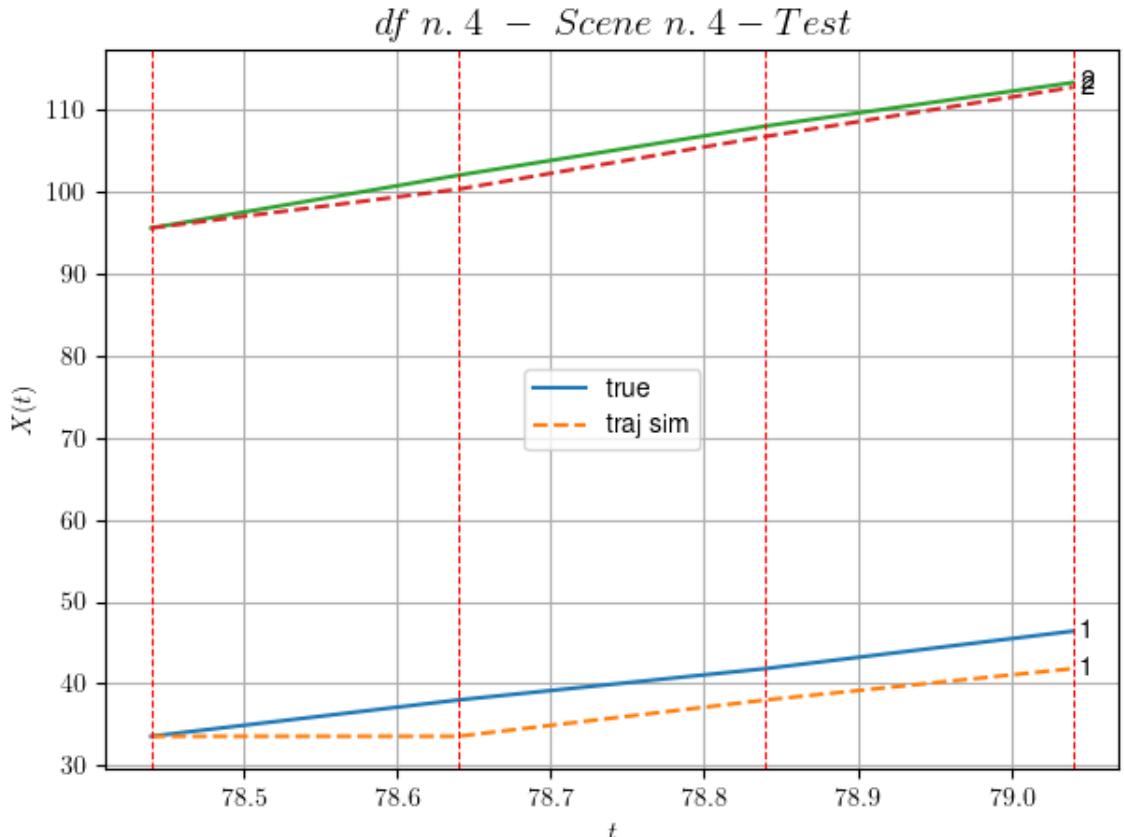
For scene 2/23:
* MSE = 12.671918336817955

DataFrame n.4. Scene n.3/23



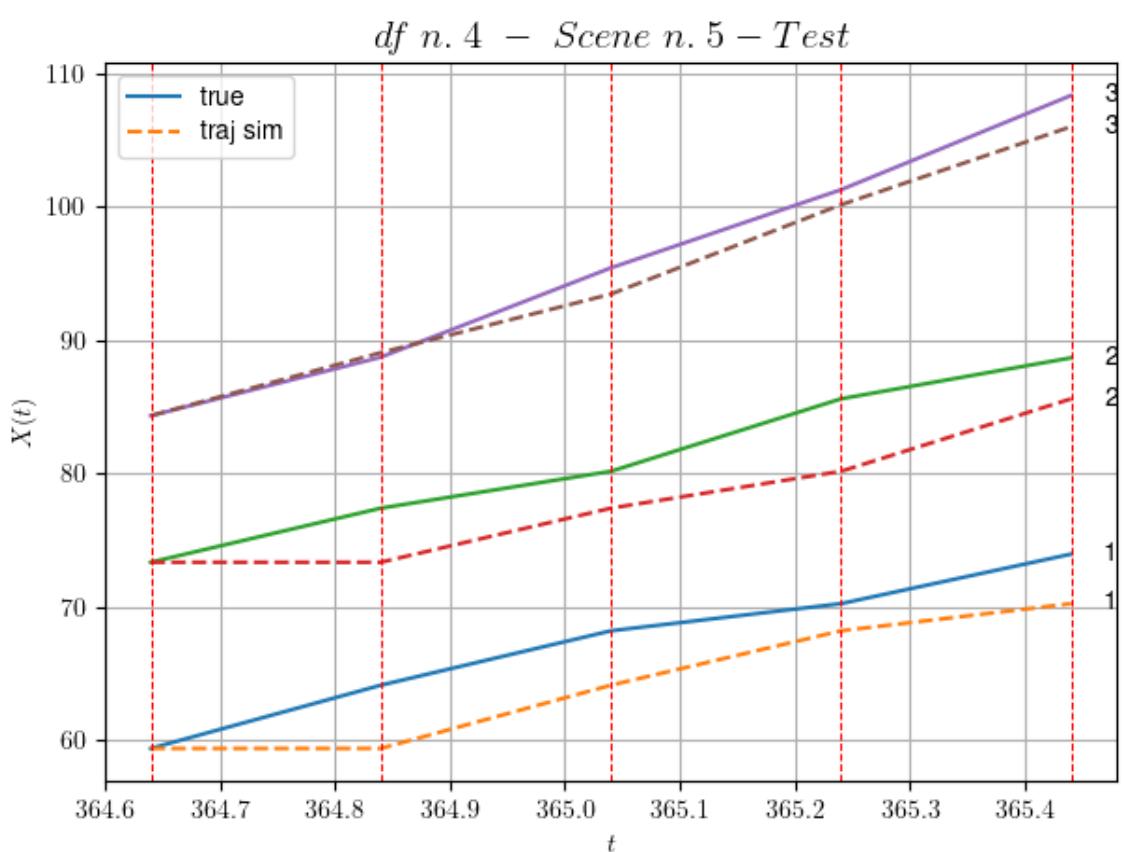
For scene 3/23:
* MSE = 1.8009963581164126

DataFrame n.4. Scene n.4/23



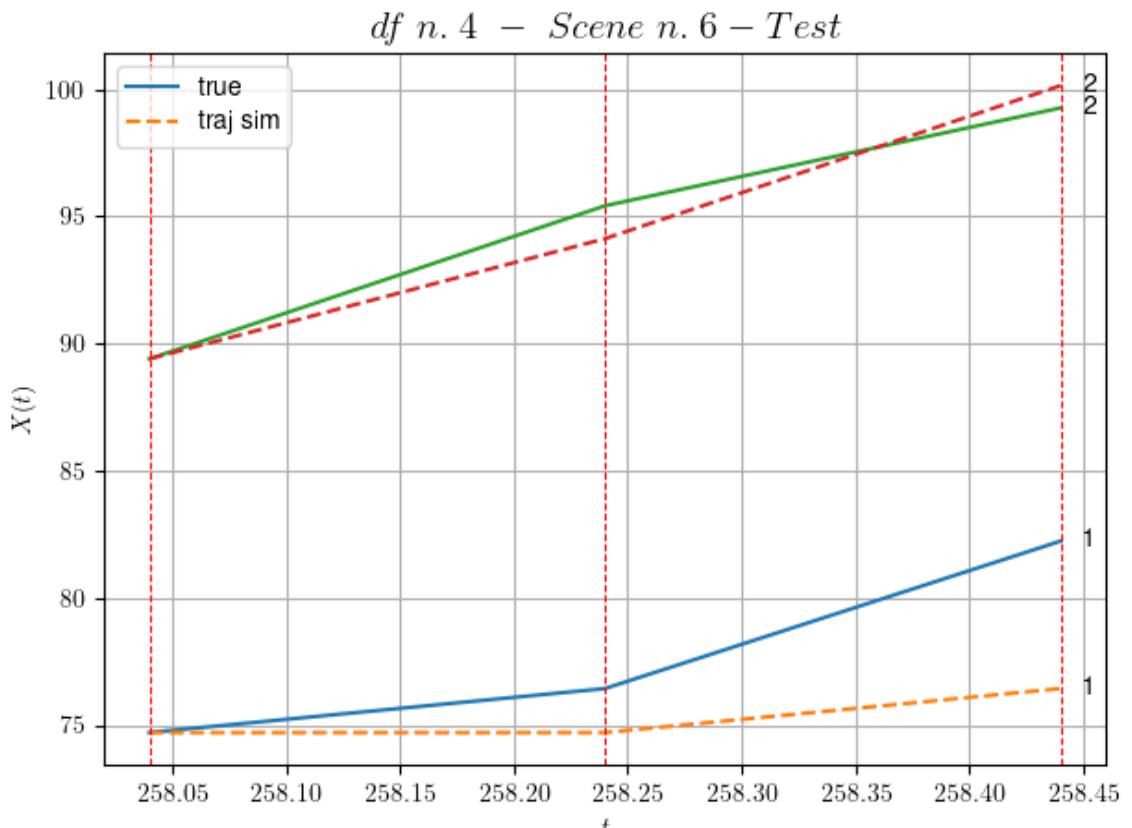
For scene 4/23:
* MSE = 7.480410036416214

DataFrame n.4. Scene n.5/23



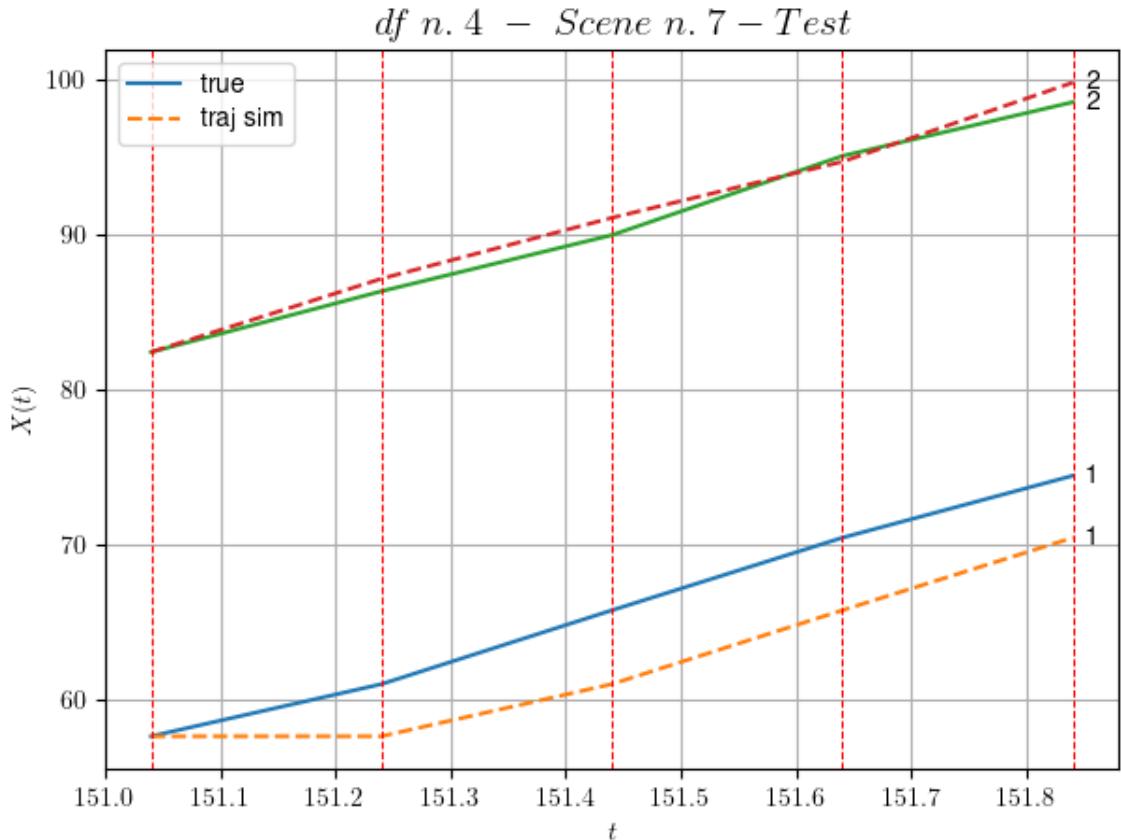
For scene 5/23:
* MSE = 8.713529265389512

DataFrame n.4. Scene n.6/23



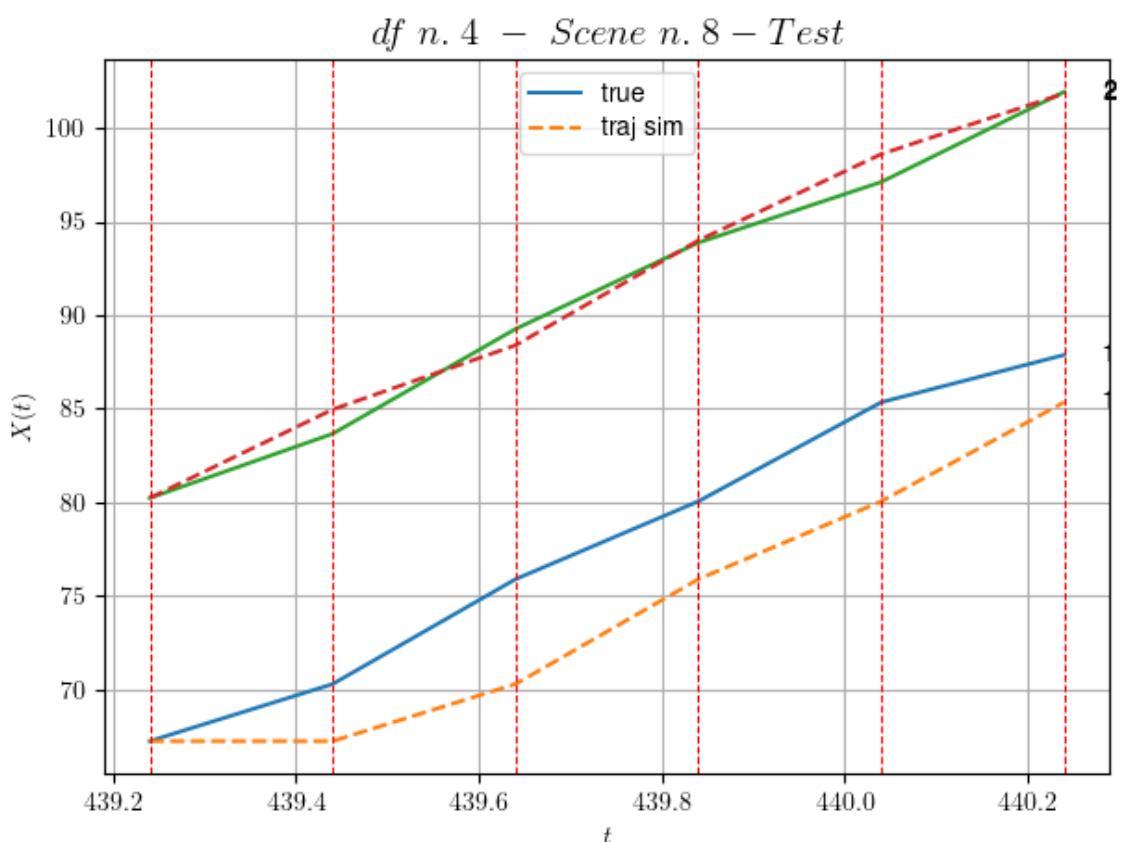
For scene 6/23:
* MSE = 6.513741492526595

DataFrame n.4. Scene n.7/23



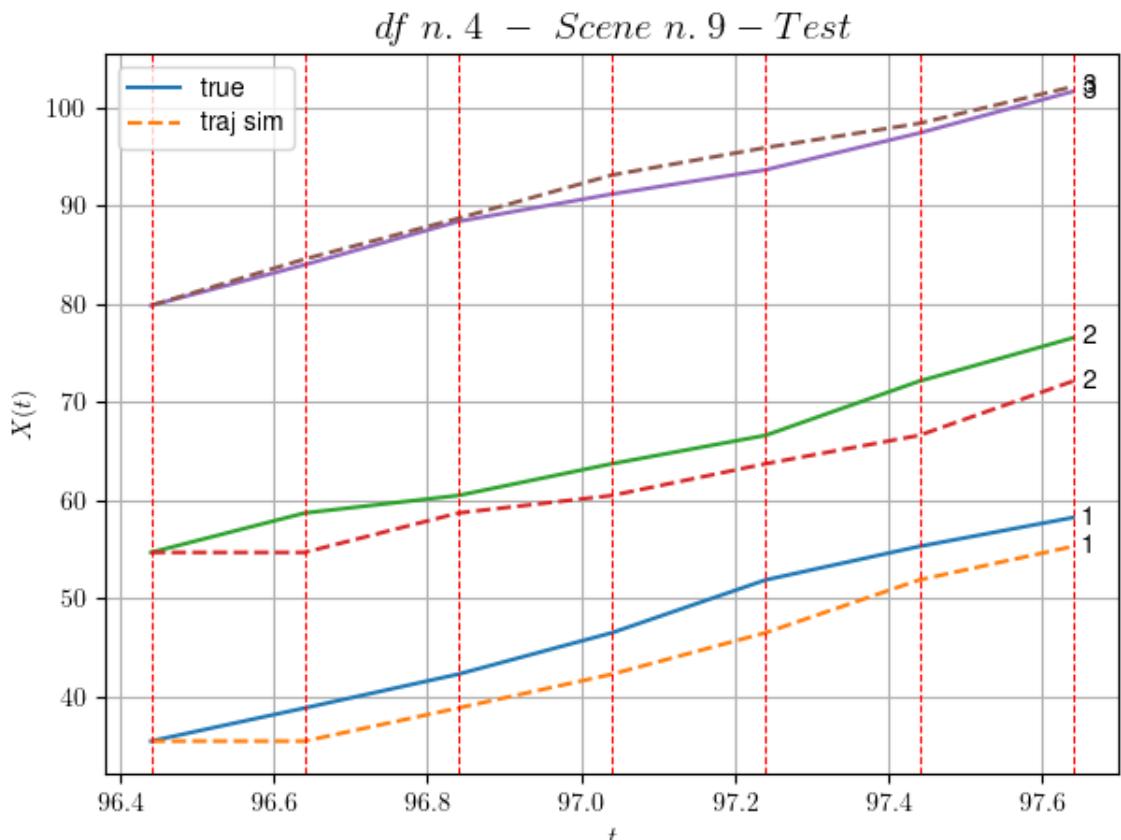
For scene 7/23:
* MSE = 7.532523176931075

DataFrame n.4. Scene n.8/23



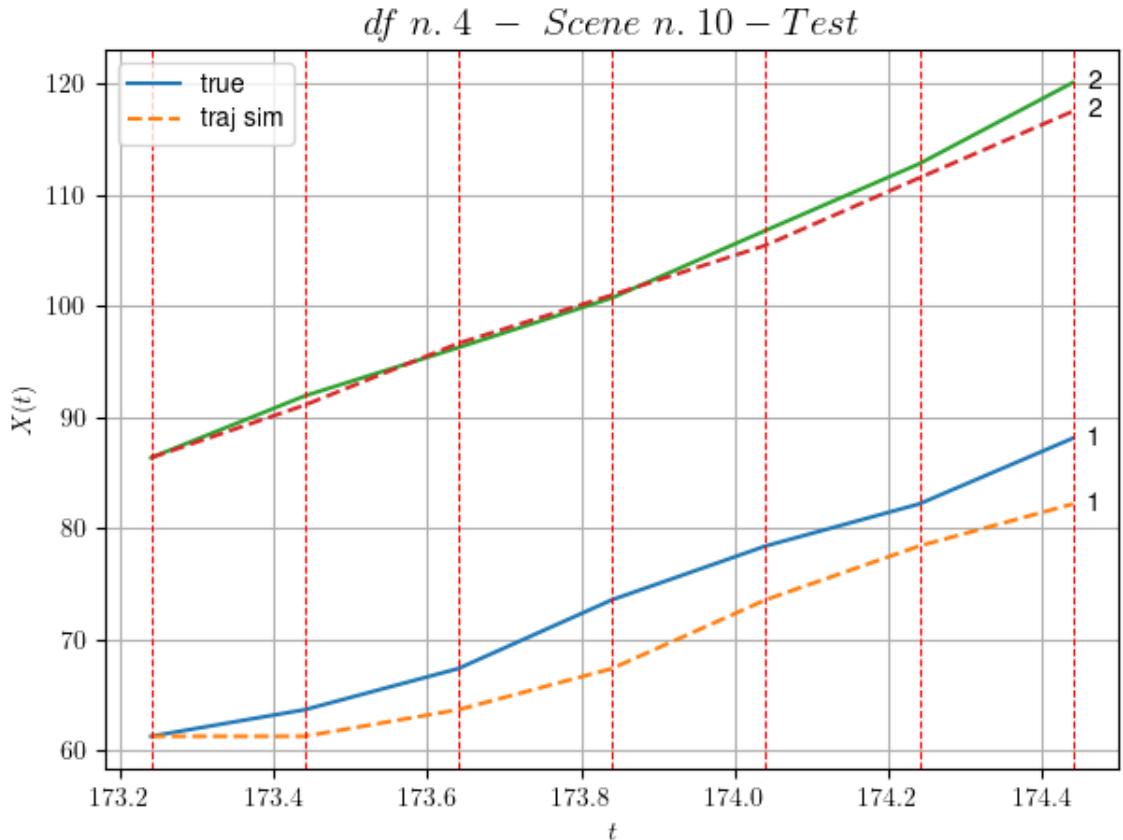
For scene 8/23:
* MSE = 8.090462801430359

DataFrame n.4. Scene n.9/23



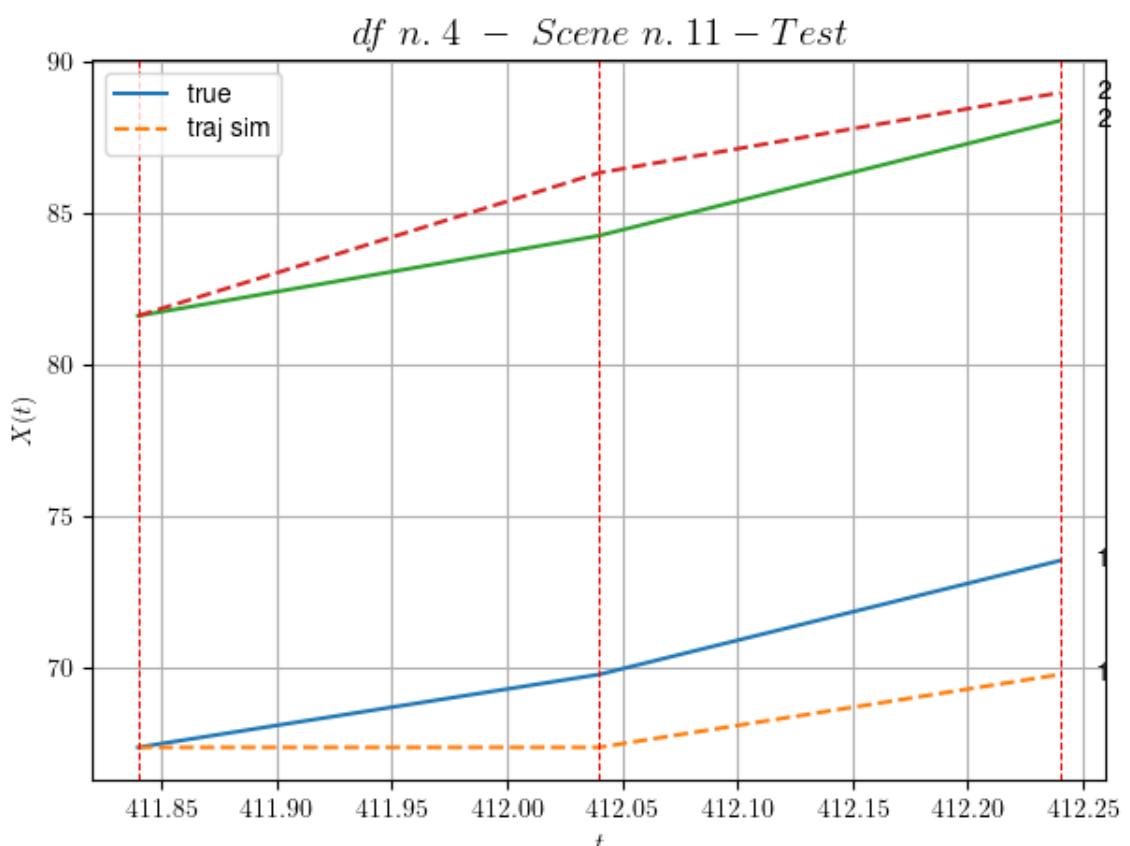
For scene 9/23:
* MSE = 8.997939142627944

DataFrame n.4. Scene n.10/23



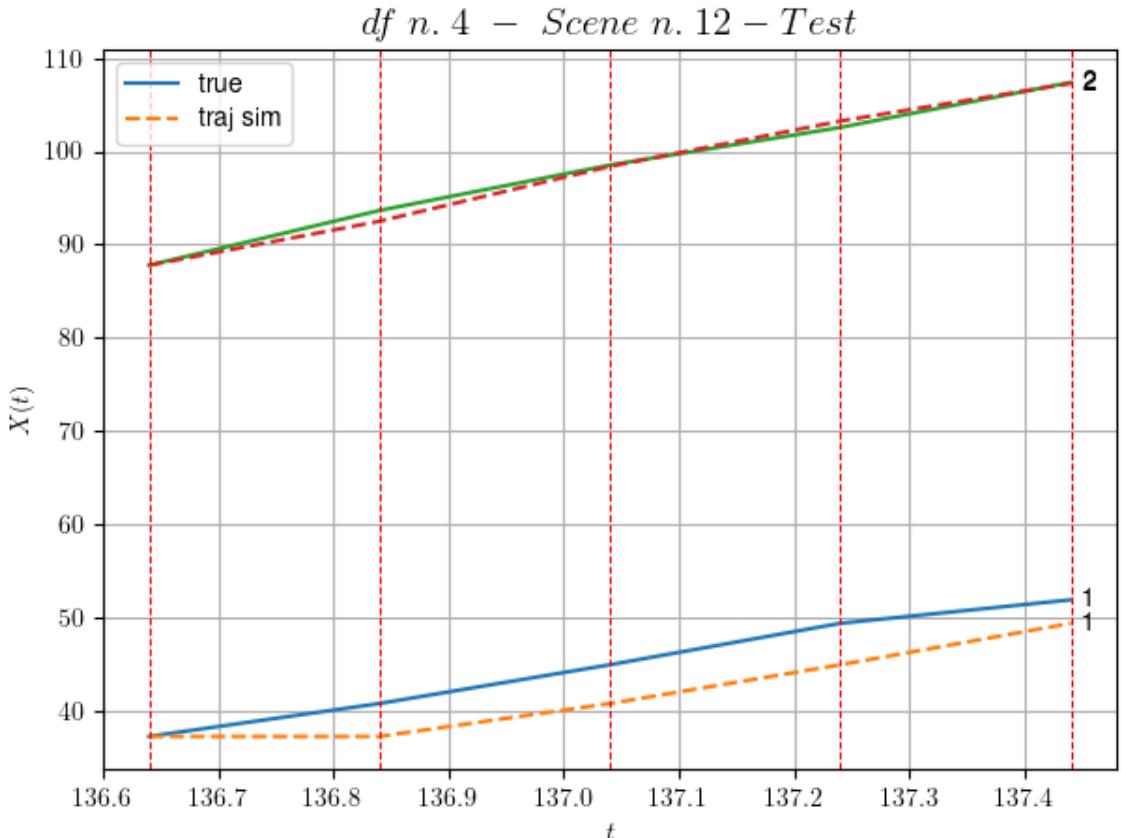
For scene 10/23:
* MSE = 10.101774095145583

DataFrame n.4. Scene n.11/23



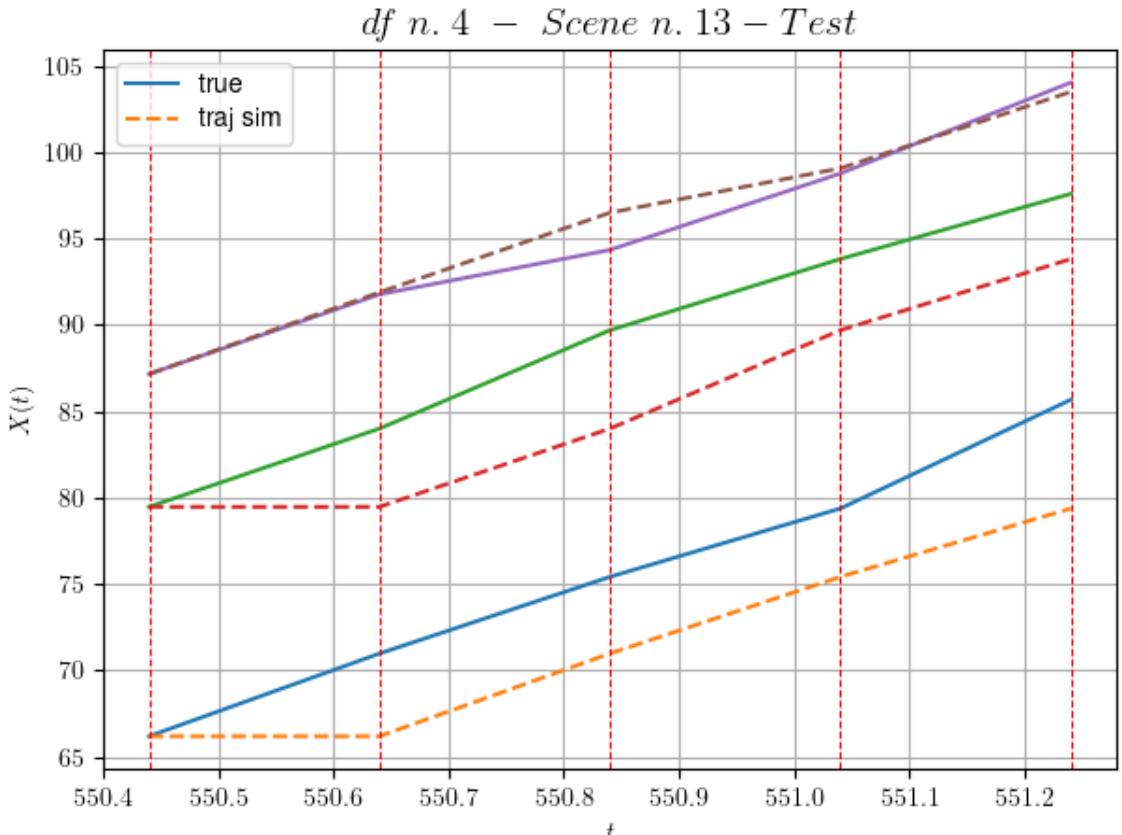
For scene 11/23:
* MSE = 4.1918384032905225

DataFrame n.4. Scene n.12/23



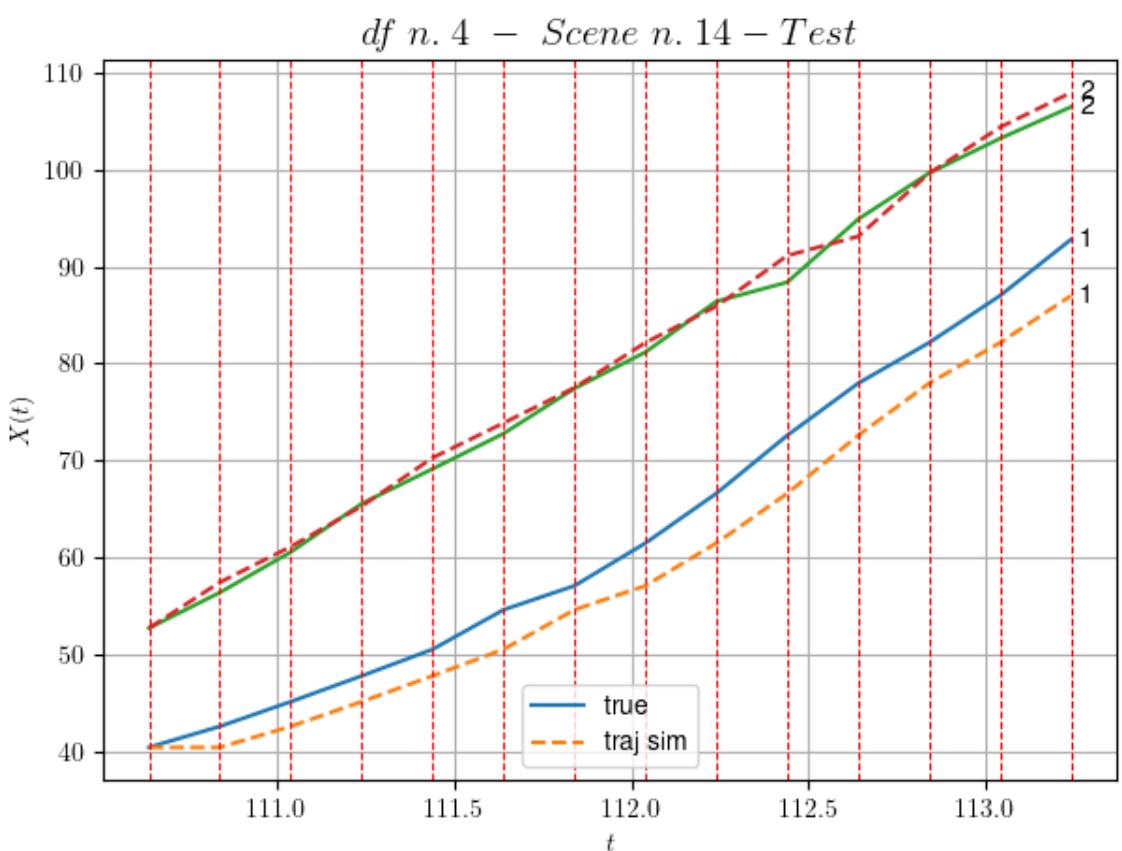
For scene 12/23:
* MSE = 5.781290662038587

DataFrame n.4. Scene n.13/23



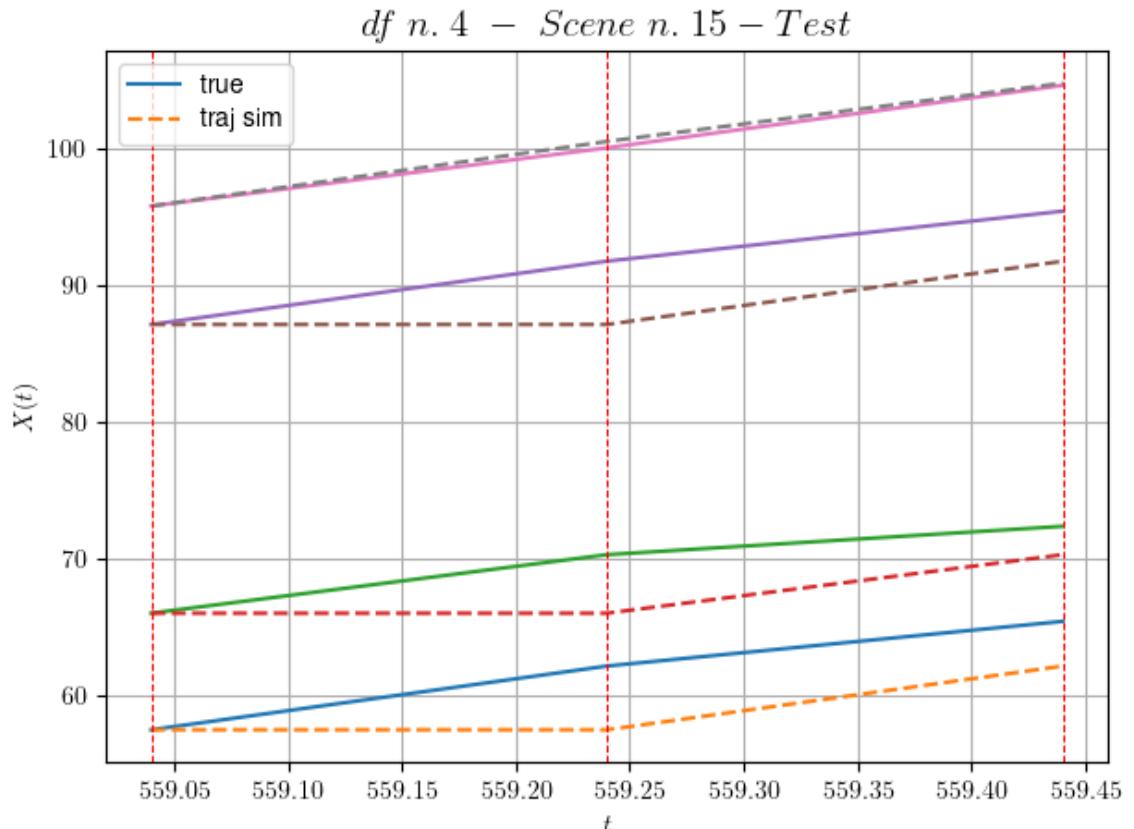
For scene 13/23:
* MSE = 12.490981792036182

DataFrame n.4. Scene n.14/23



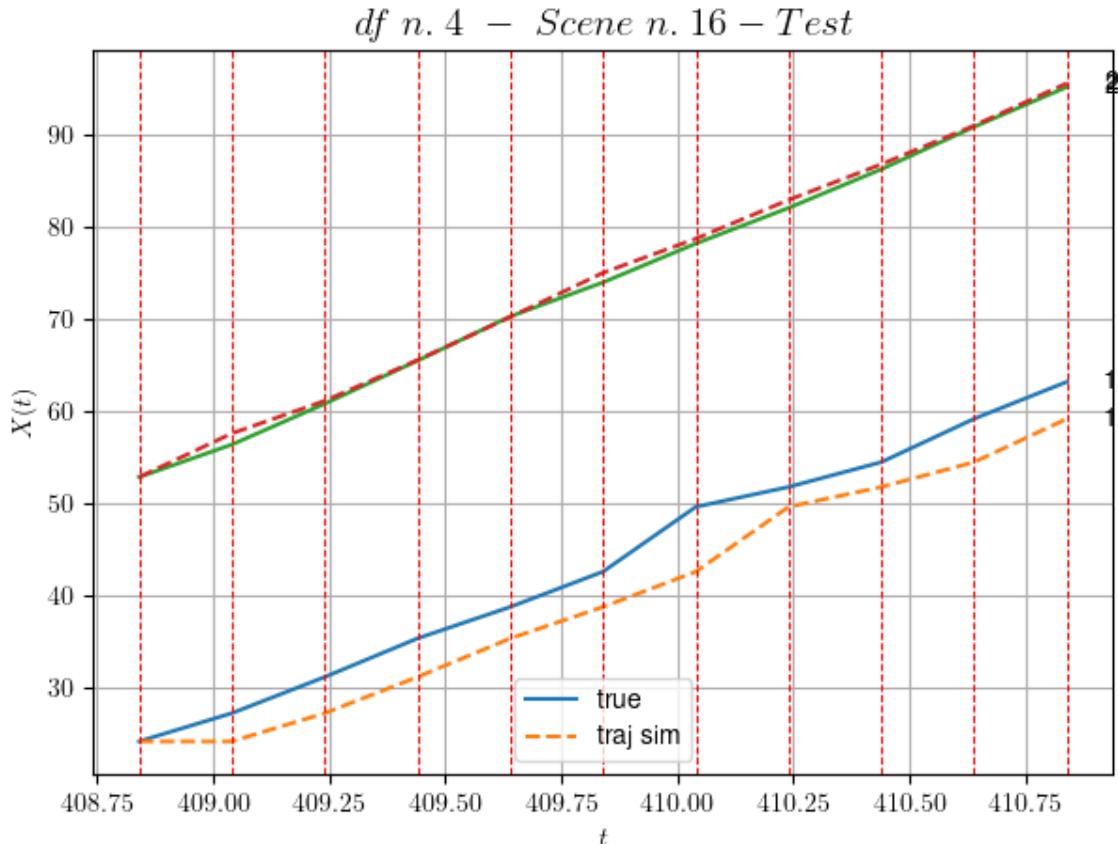
For scene 14/23:
* MSE = 9.041278945367331

DataFrame n.4. Scene n.15/23



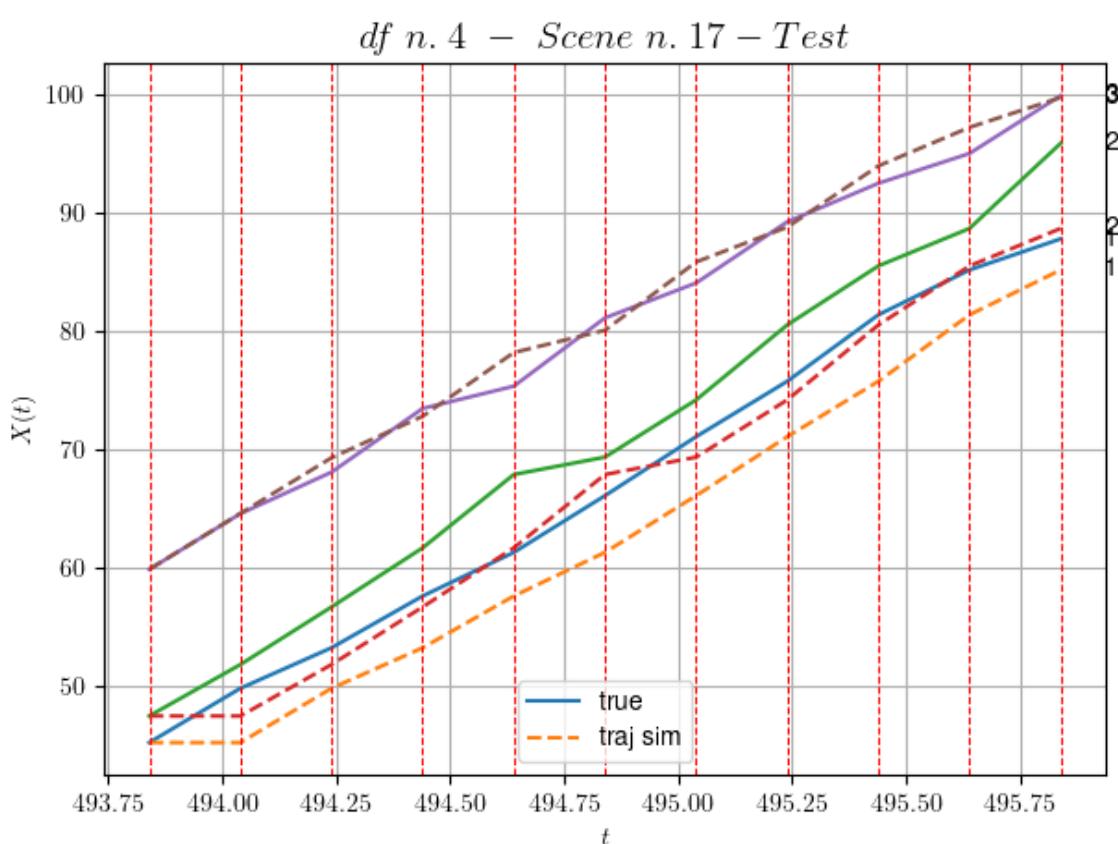
For scene 15/23:
* MSE = 7.513091844401931

DataFrame n.4. Scene n.16/23



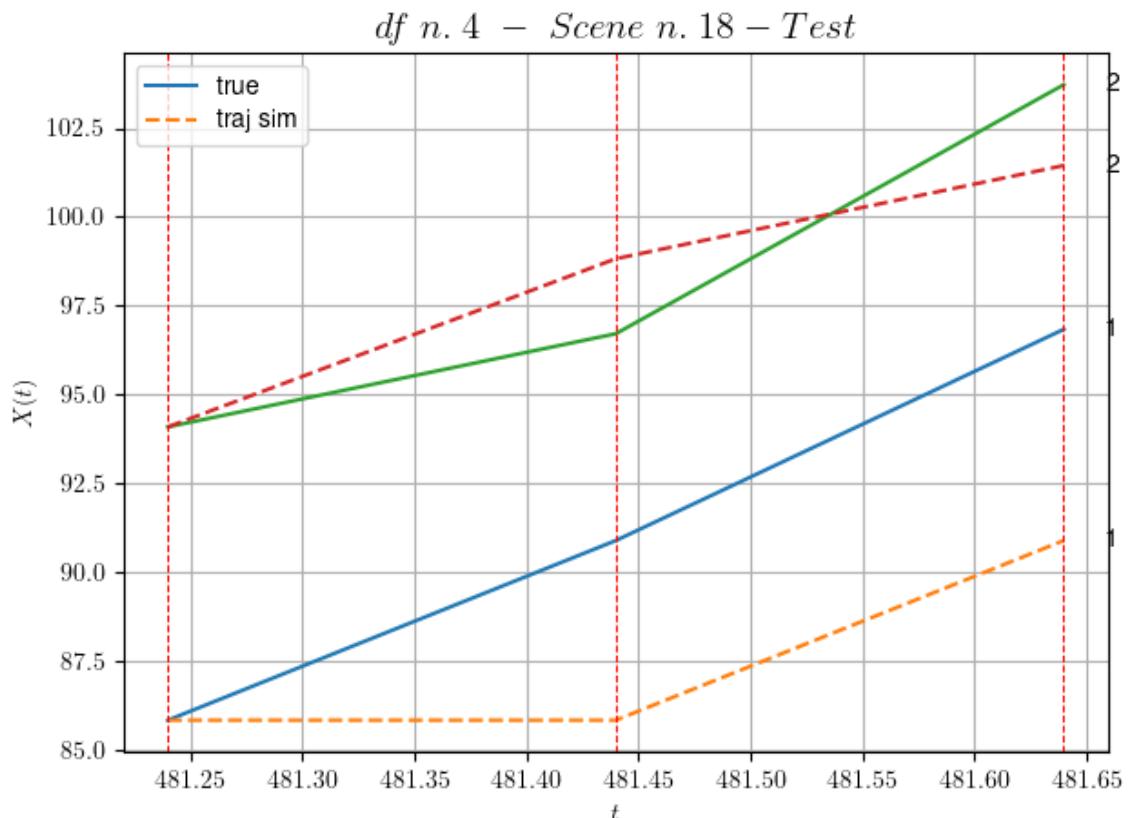
For scene 16/23:
* MSE = 7.8005209342792625

DataFrame n.4. Scene n.17/23



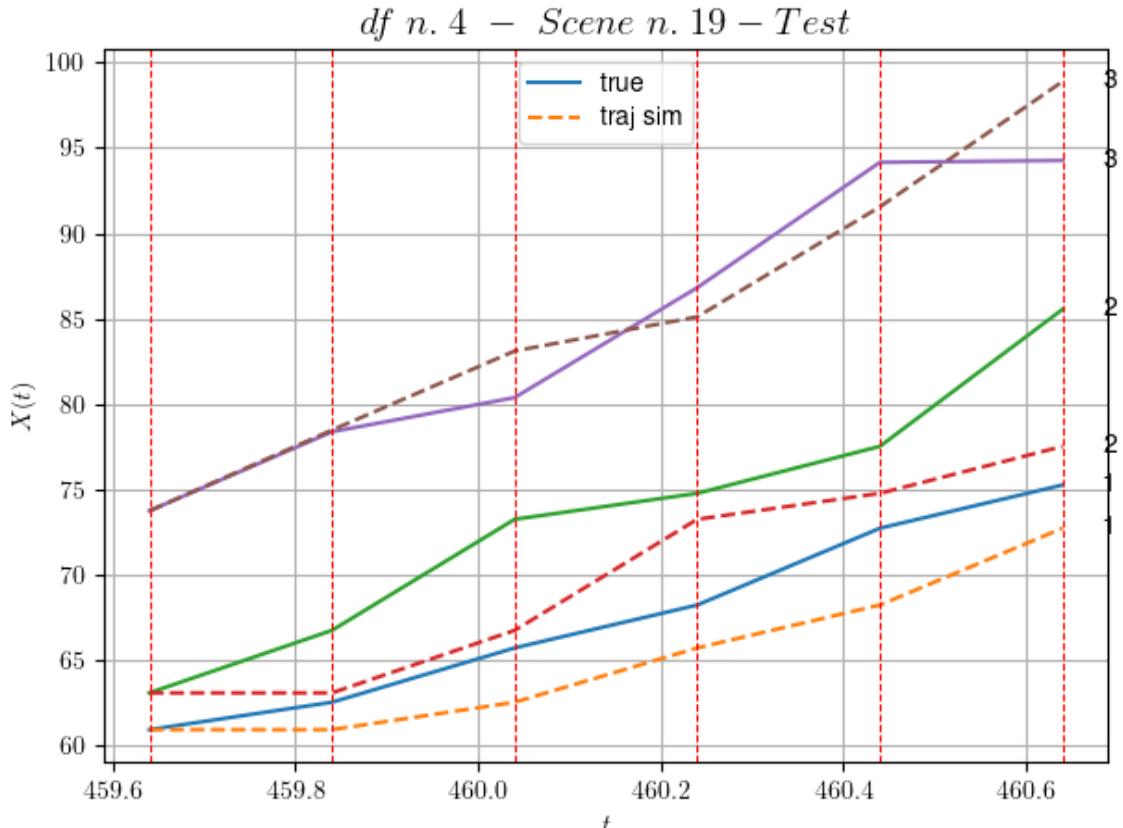
For scene 17/23:
* MSE = 14.19792033778162

DataFrame n.4. Scene n.18/23



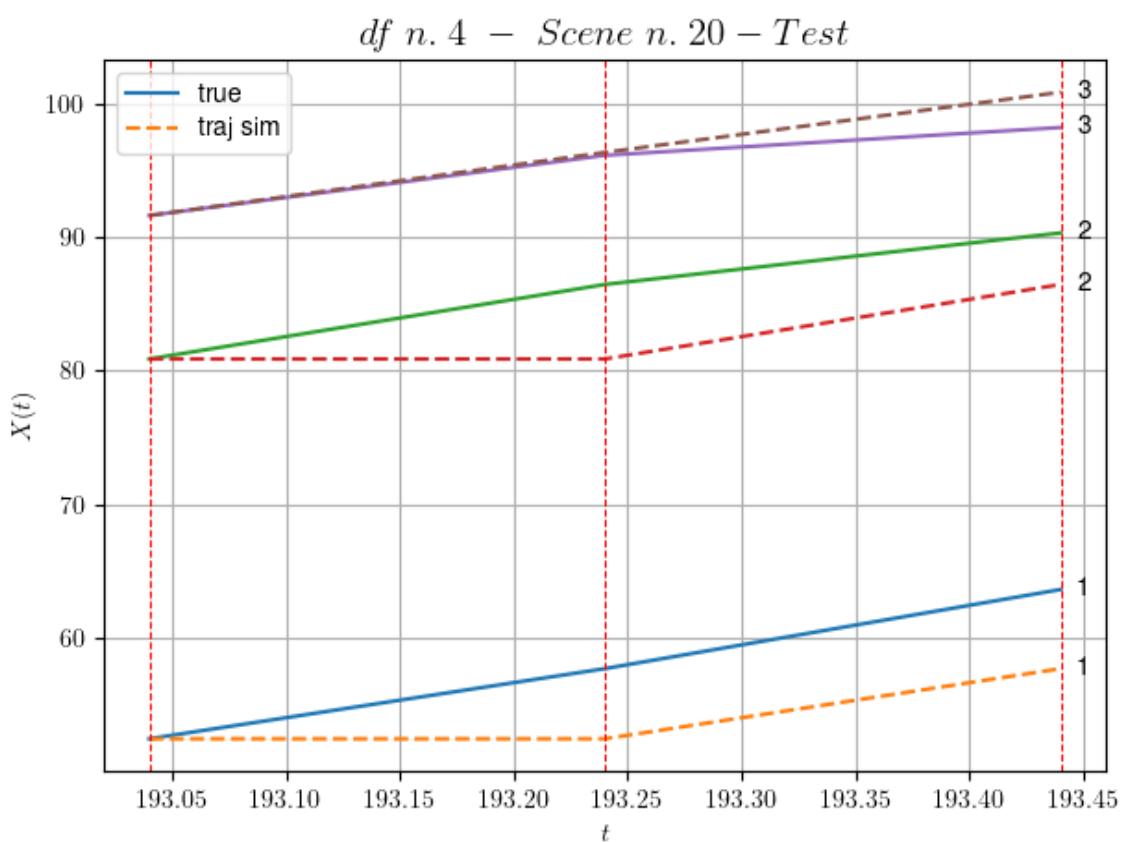
For scene 18/23:
* MSE = 11.731930795291204

DataFrame n.4. Scene n.19/23



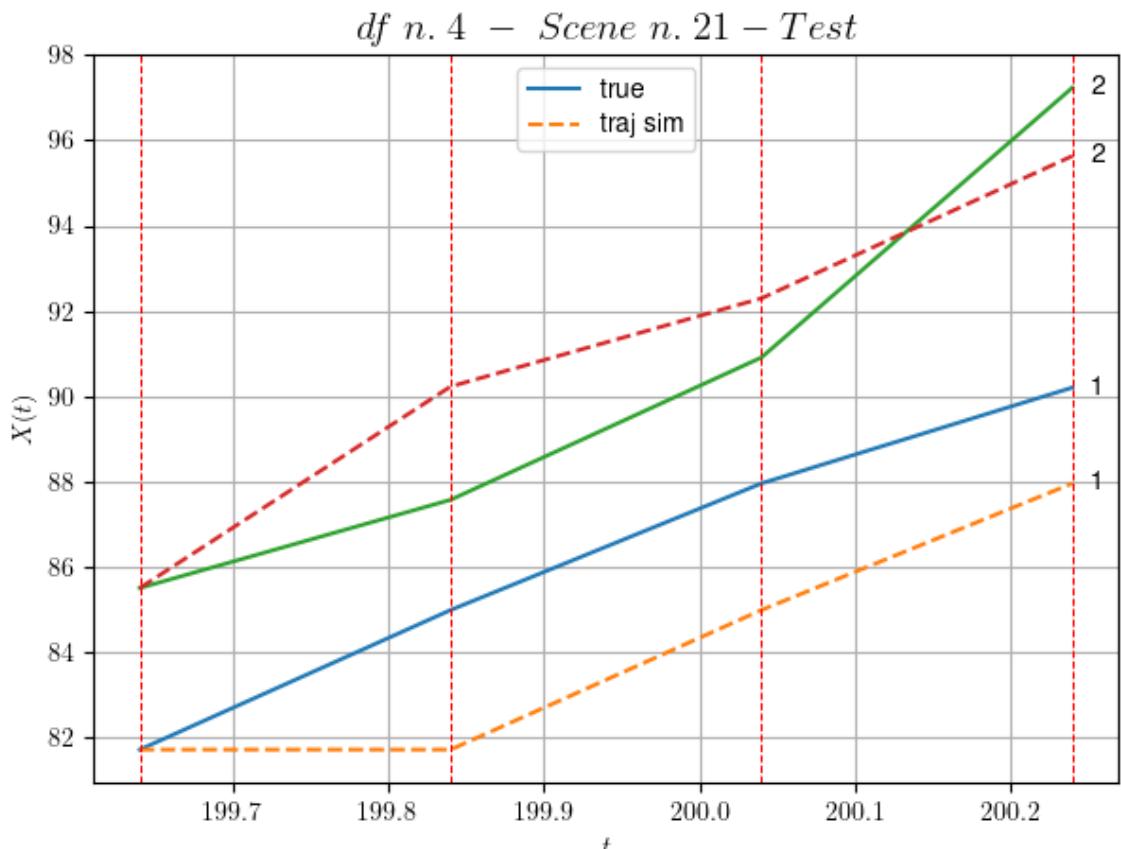
For scene 19/23:
* MSE = 11.887216067260558

DataFrame n.4. Scene n.20/23



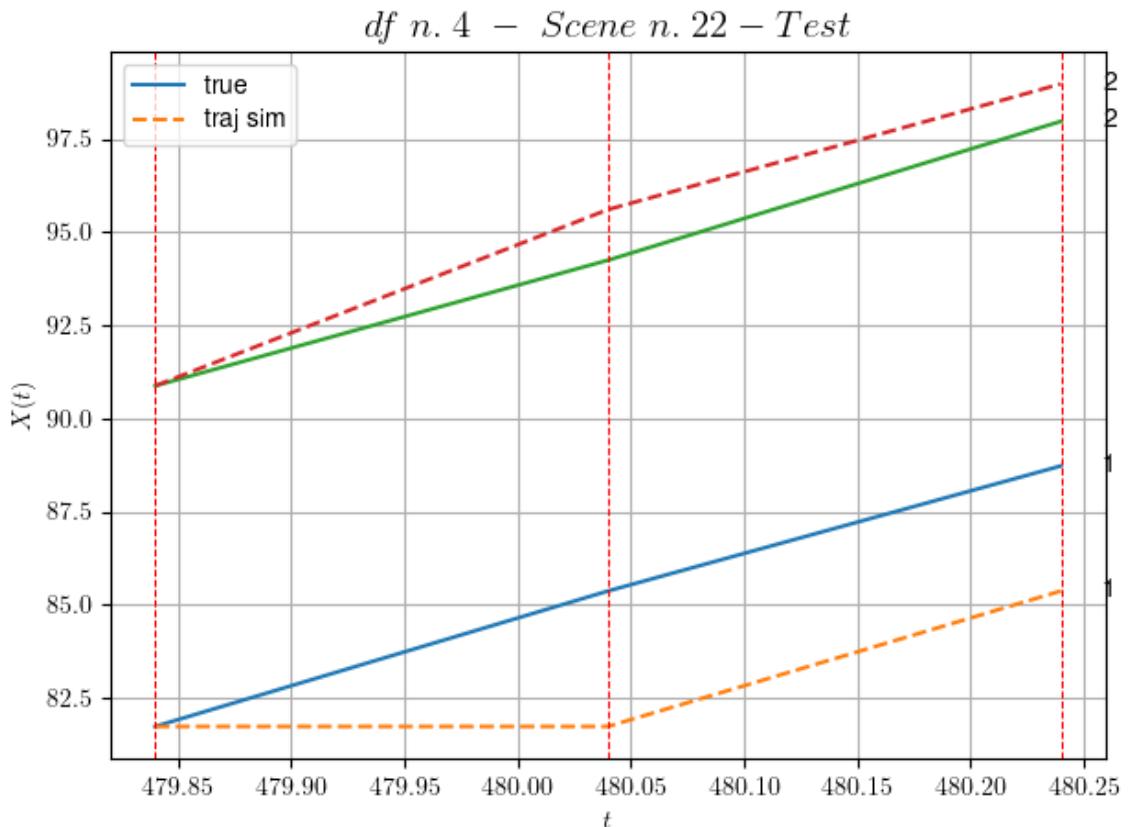
For scene 20/23:
* MSE = 12.870102716652852

DataFrame n.4. Scene n.21/23



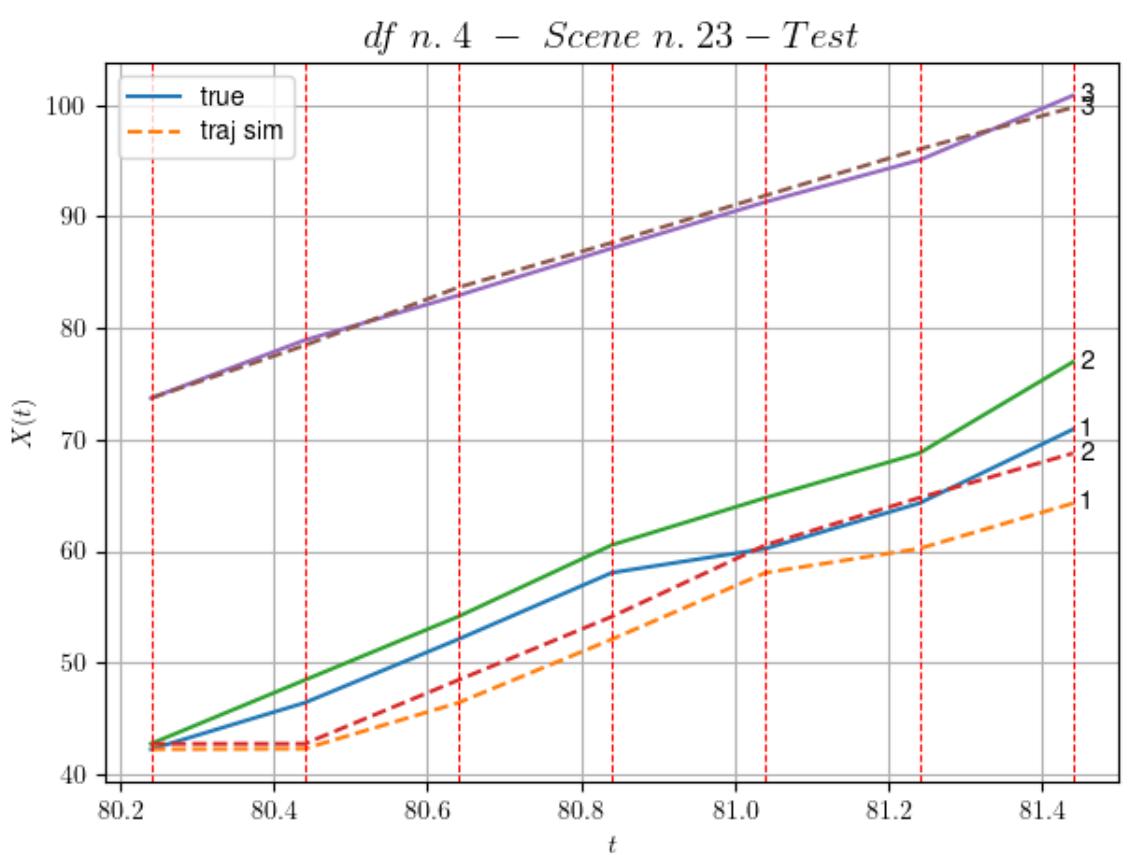
For scene 21/23:
* MSE = 4.523490239887727

DataFrame n.4. Scene n.22/23



For scene 22/23:
* MSE = 4.552528118326453

DataFrame n.4. Scene n.23/23



For scene 23/23:
* MSE = 17.18152354520758

MSE test: 8.967621043578225

Summing up:
* MSE train: 105.36962736884067
* MSE test: 8.967621043578225

Analyzing 5/10 dfs.

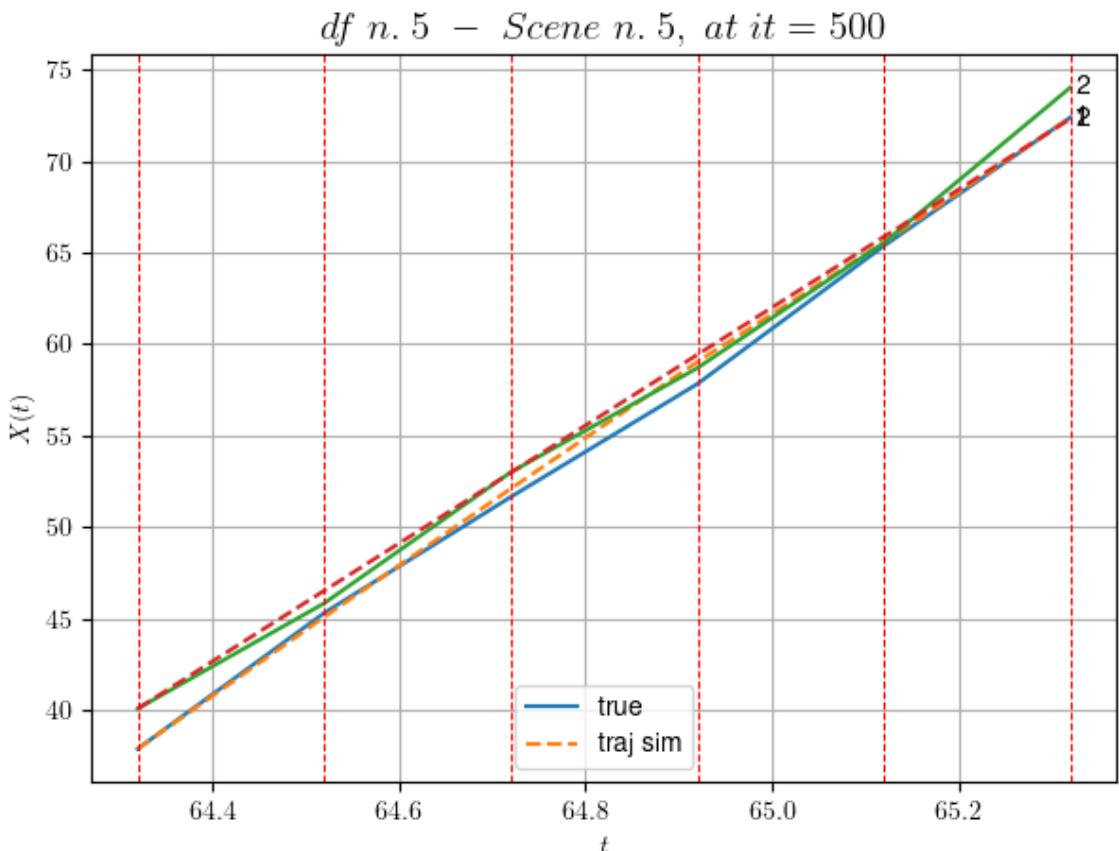
In DataFrame n.5 we have 66 scenes.

To train the model we use 44 scenes, the remaining 22 to test the model.

Training step. (44 scenes)

DataFrame n.5. Scene n.1/44

We have 5 time intervals inside [64.32,65.32]



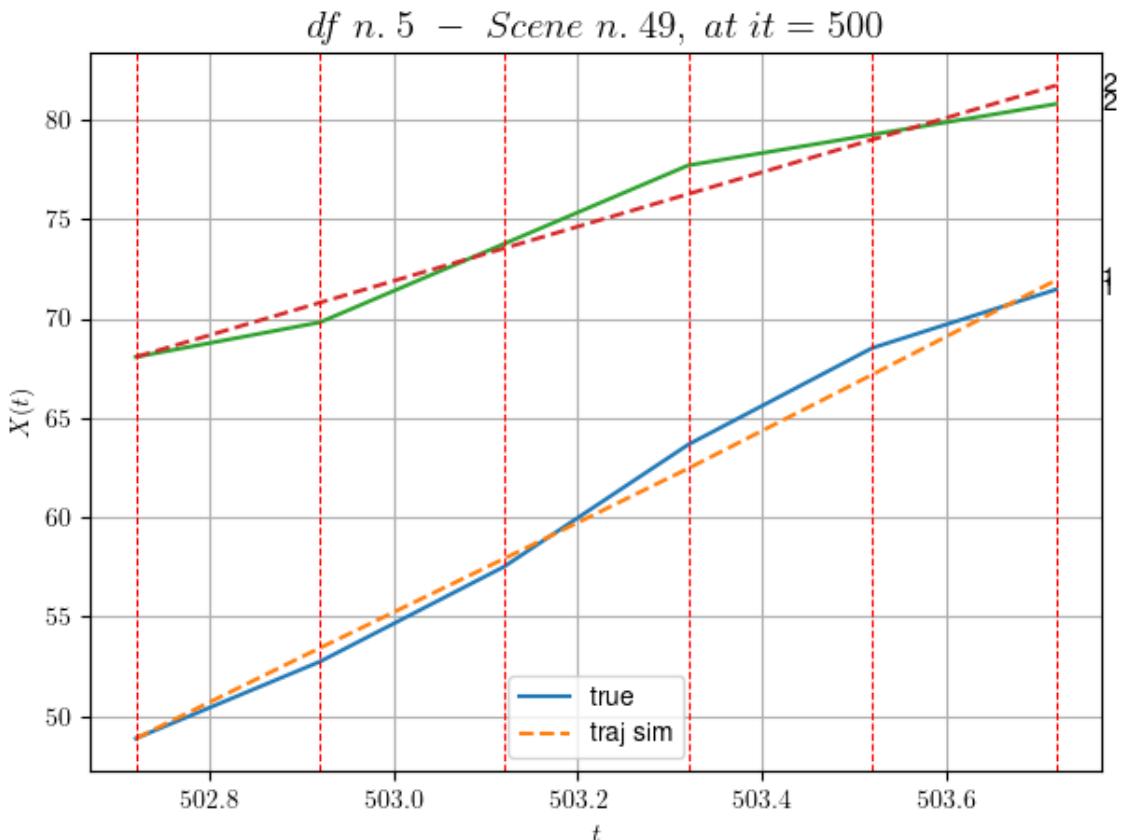
```

For scene 1/44:
* After LR finder: LR_NN=0.005 with mse=1.7520211343684384
at it=24
* v0 = 32.23387857341339
* MSE = 0.4804676359827733
* iterations = 500

```

DataFrame n.5. Scene n.2/44

We have 5 time intervals inside [502.72,503.72]



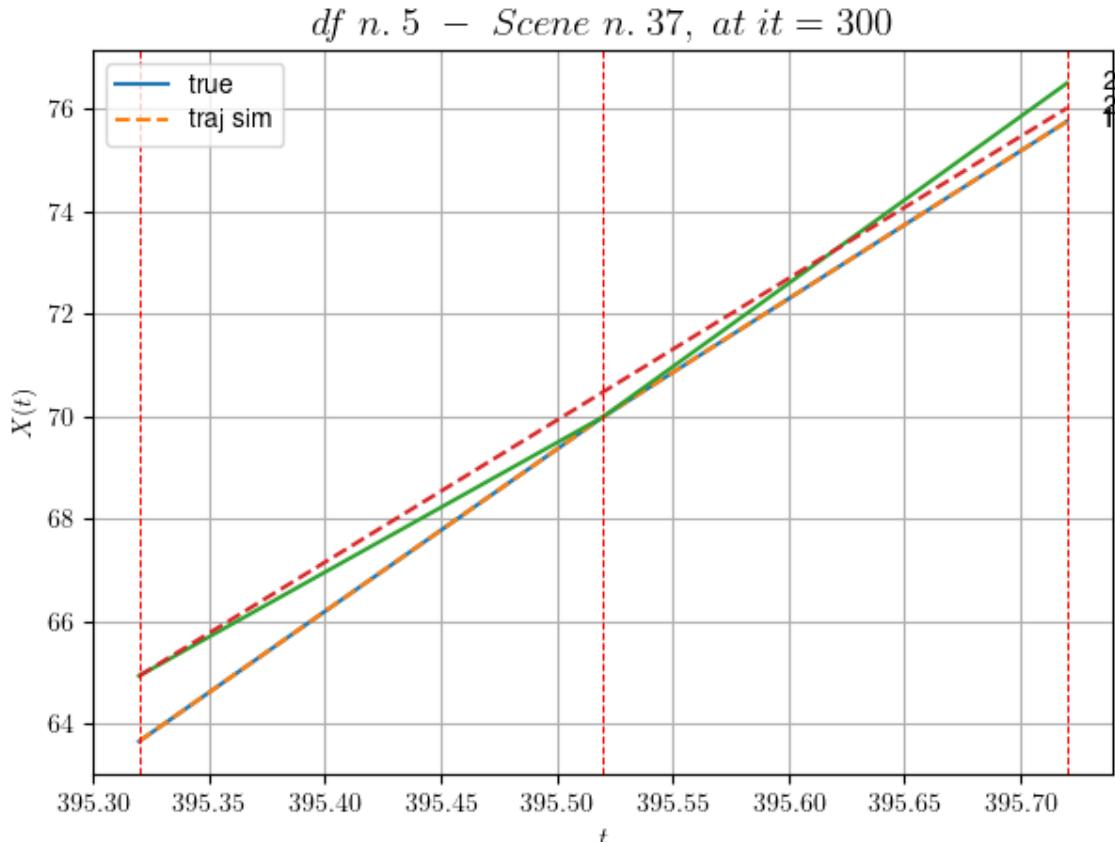
```

For scene 2/44:
* After LR finder: LR_NN=5e-05 with mse=49.78650623562598 a
t it=24
* v0 = 13.65141402204998
* MSE = 0.6710216212673346
* iterations = 500

```

DataFrame n.5. Scene n.3/44

We have 2 time intervals inside [395.32,395.72]

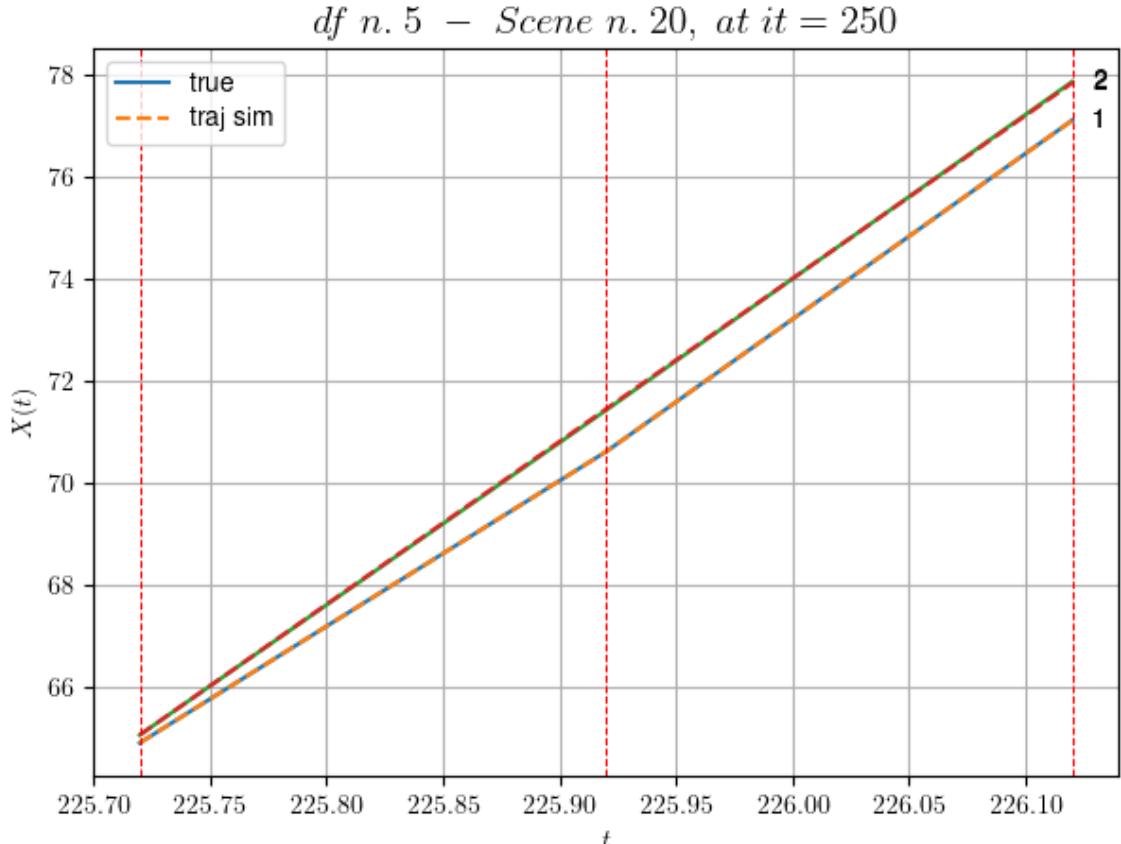


For scene 3/44:

* After LR finder: LR_NN=0.01 with mse=0.18054046692873355
at it=24
* v0 = 27.699213779675283
* MSE = 0.07069011394563596
* iterations = 300

DataFrame n.5. Scene n.4/44

We have 2 time intervals inside [225.72, 226.12]

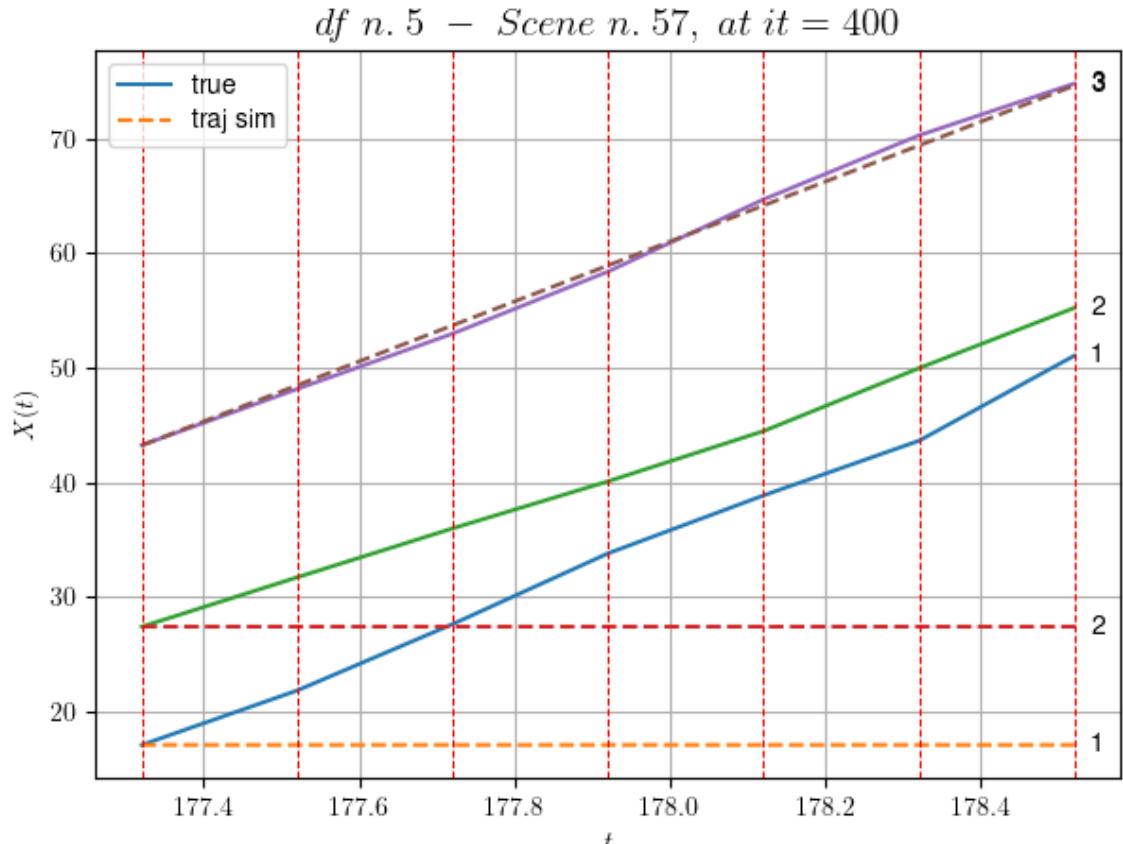


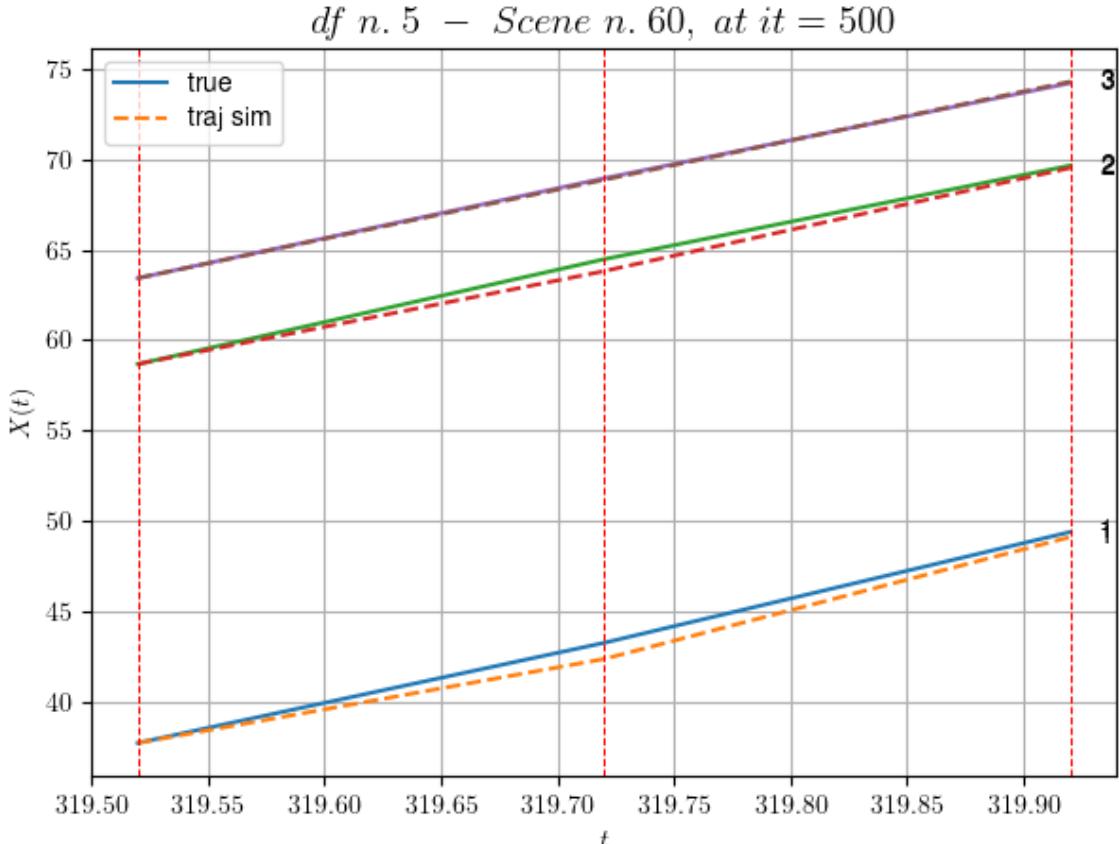
For scene 4/44:

* After LR finder: LR_NN=0.01 with mse=0.13989461212789905
at it=24
* v0 = 32.02147602886436
* MSE = 0.0002198692093902678
* iterations = 250

DataFrame n.5. Scene n.5/44

We have 6 time intervals inside [177.32,178.52]



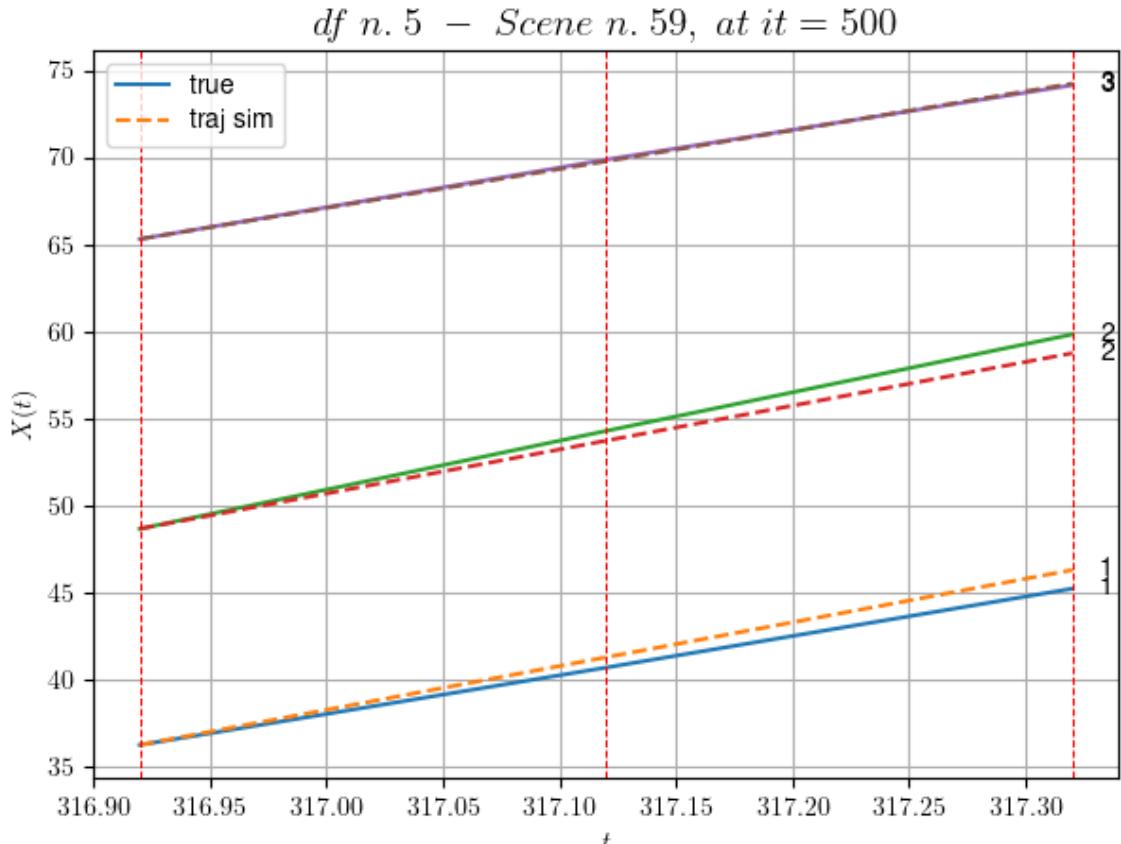


For scene 6/44:

* After LR finder: LR_NN=0.001 with mse=6.919672353337319 at it=24
* $v_0 = 27.222459940407113$
* MSE = 0.07390244550306167
* iterations = 500

DataFrame n.5. Scene n.7/44

We have 2 time intervals inside [316.92,317.32]



For scene 7/44:

* After LR finder: LR_NN=0.001 with mse=1.3449408681865647

at it=24

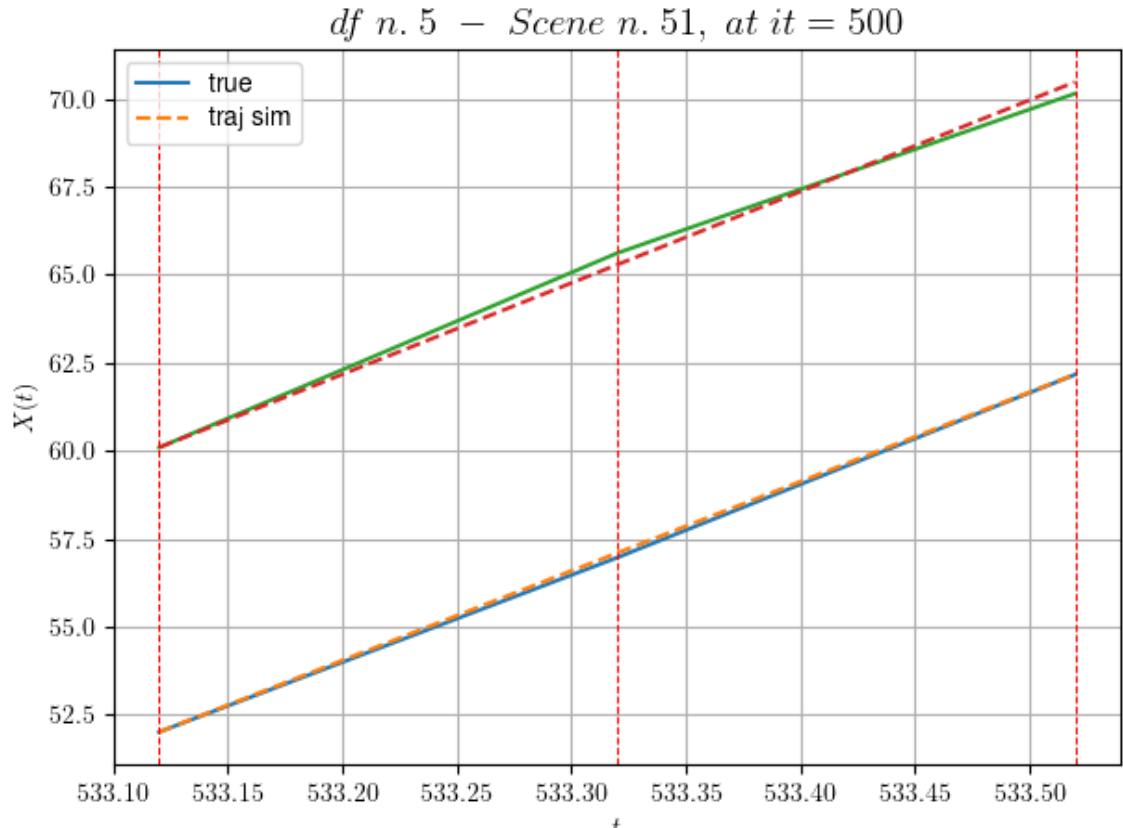
* v0 = 22.34204586121116

* MSE = 0.26125072137174193

* iterations = 500

DataFrame n.5. Scene n.8/44

We have 2 time intervals inside [533.12,533.52]

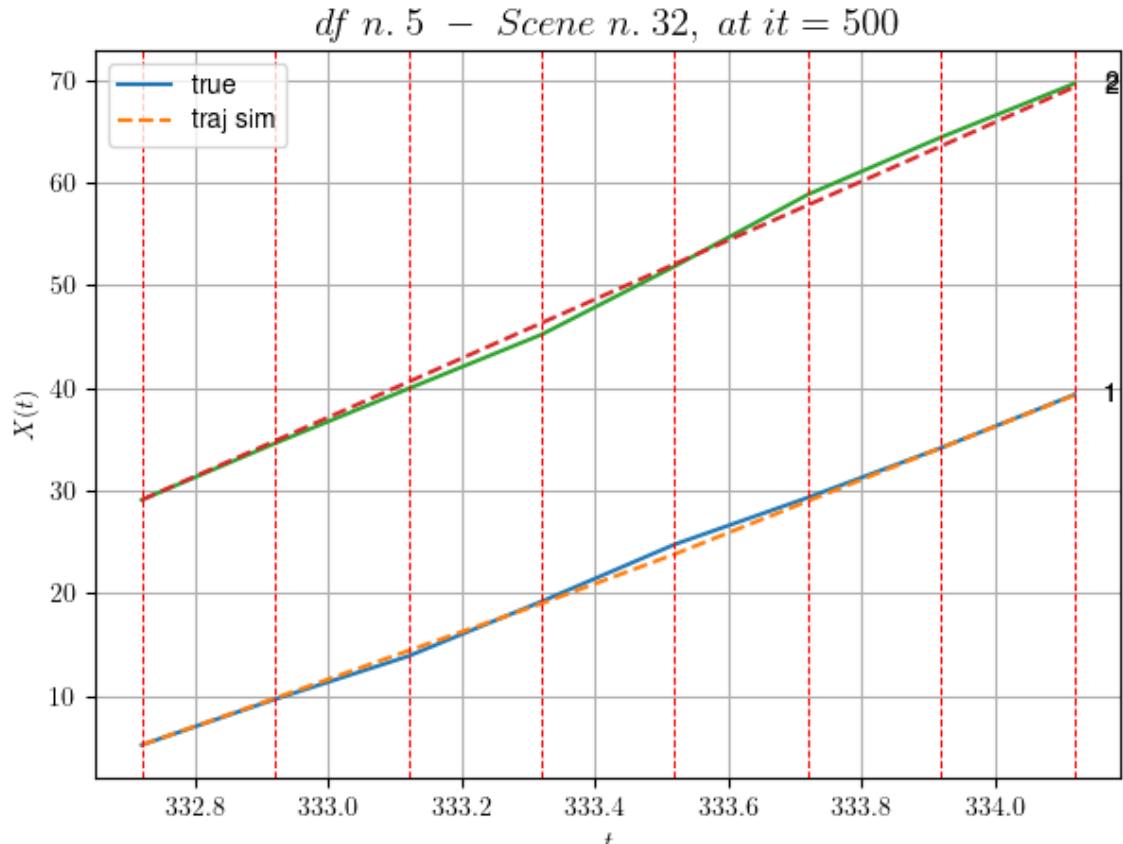


For scene 8/44:

* After LR finder: LR_NN=0.0005 with mse=0.6721187540276515
at it=24
* v0 = 25.948720292496567
* MSE = 0.03883535053578276
* iterations = 500

DataFrame n.5. Scene n.9/44

We have 7 time intervals inside [332.72,334.12]

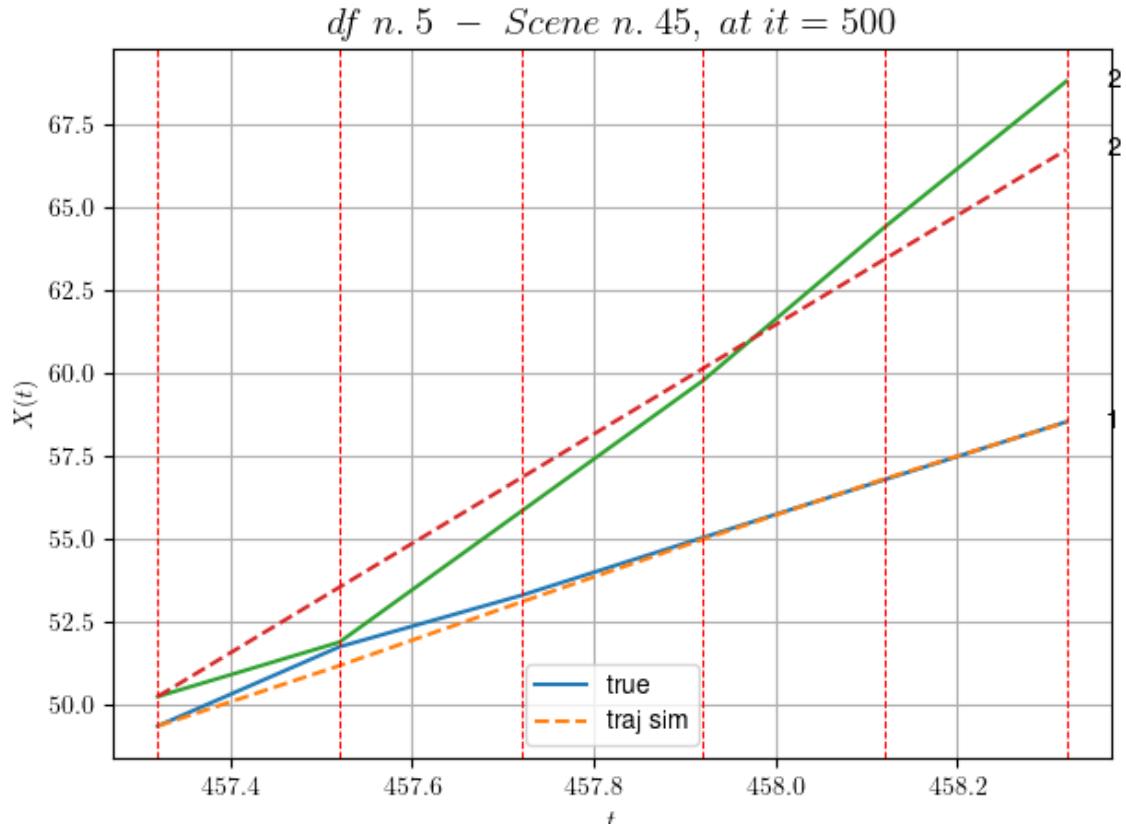


For scene 9/44:

* After LR finder: LR_NN=0.0005 with mse=0.7138774557019842
at it=24
* $v_0 = 28.714685816754848$
* MSE = 0.2944153787716737
* iterations = 500

DataFrame n.5. Scene n.10/44

We have 5 time intervals inside [457.32,458.32]

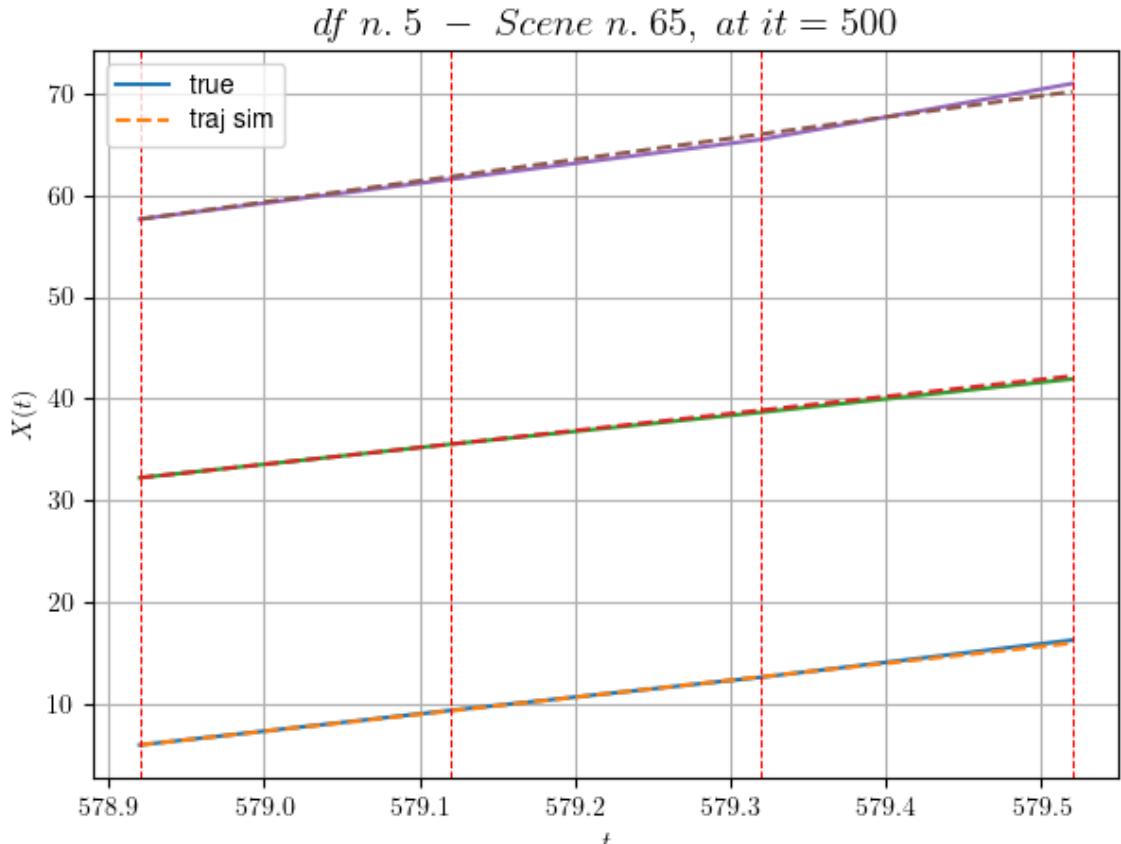


For scene 10/44:

* After LR finder: LR_NN=0.01 with mse=30.00355000502224 at
it=24
* v0 = 16.493097805853914
* MSE = 0.6789863055574995
* iterations = 500

DataFrame n.5. Scene n.11/44

We have 3 time intervals inside [578.92,579.52]

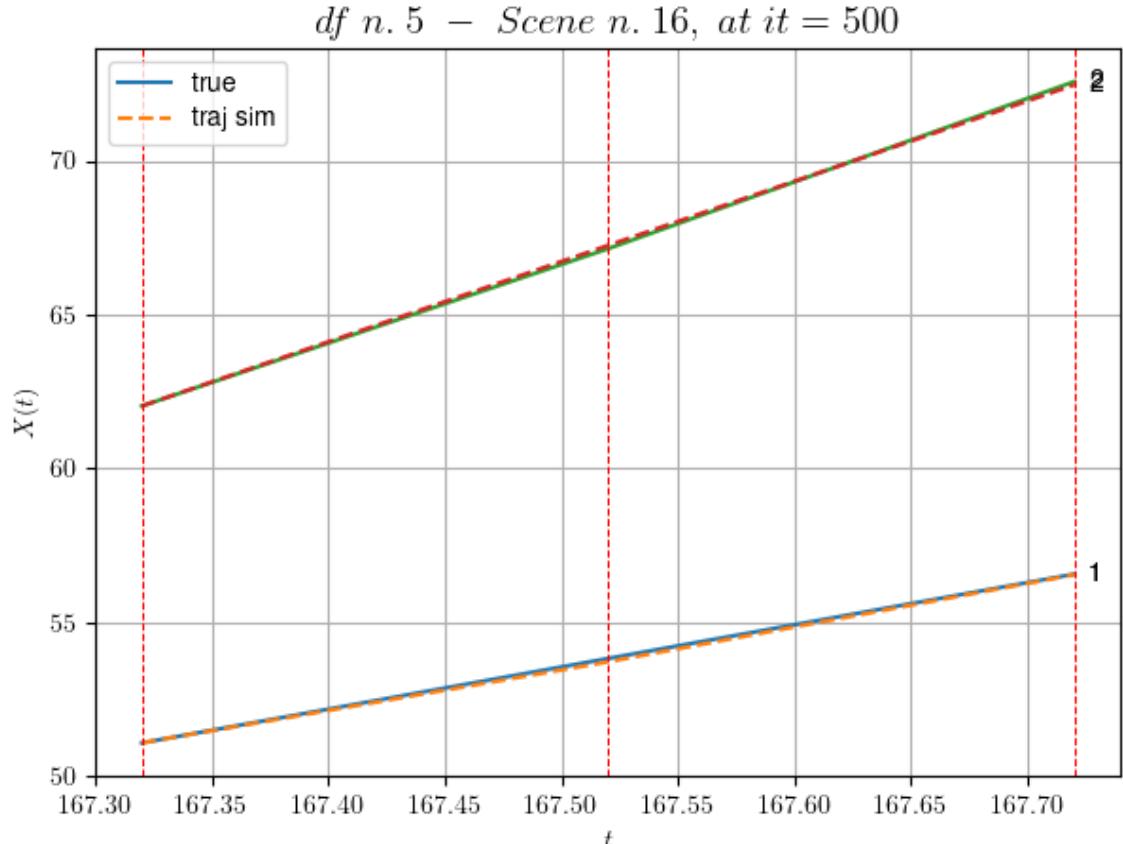


For scene 11/44:

* After LR finder: LR_NN=5e-05 with mse=3.627311286152001 at it=24
* v0 = 20.91661134775091
* MSE = 0.0928951793660655
* iterations = 500

DataFrame n.5. Scene n.12/44

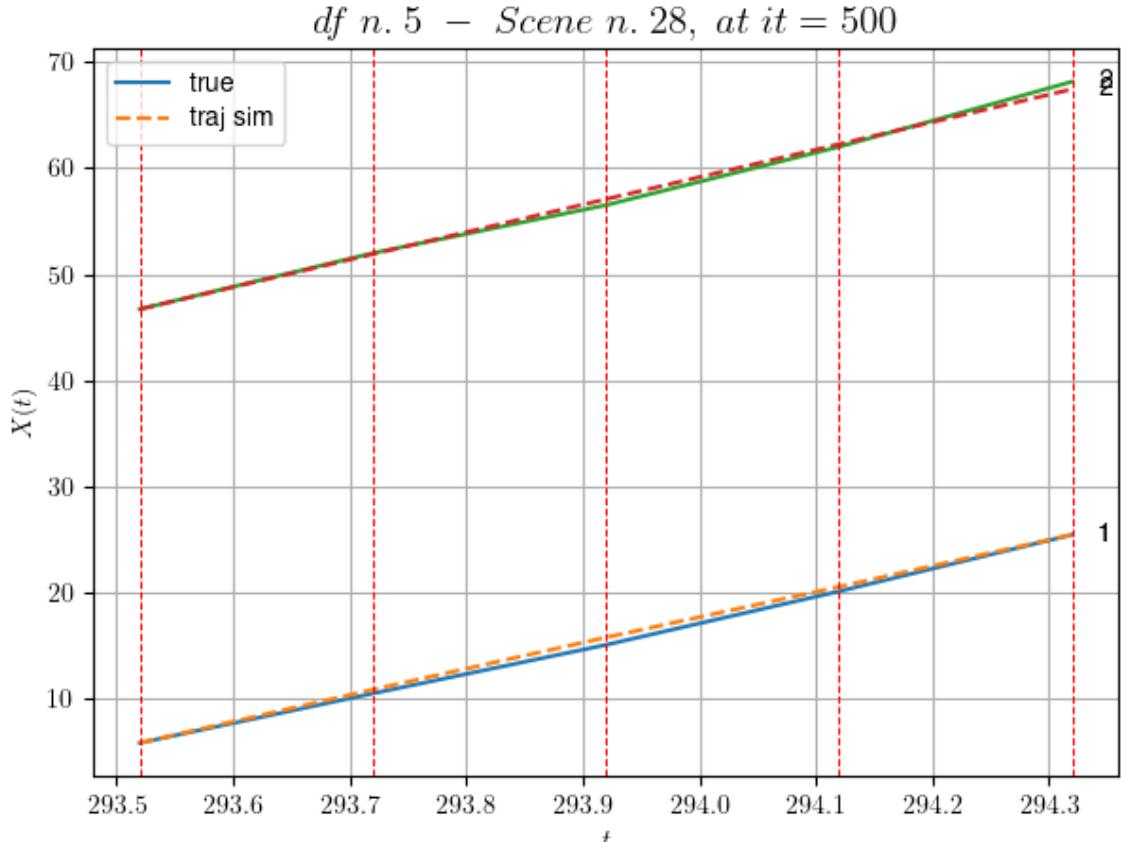
We have 2 time intervals inside [167.32,167.72]



For scene 12/44:
* After LR finder: LR_NN=0.0005 with mse=0.5024584632970334
at it=24
* v0 = 26.10725367471429
* MSE = 0.005818845985662375
* iterations = 500

DataFrame n.5. Scene n.13/44

We have 4 time intervals inside [293.52,294.32]

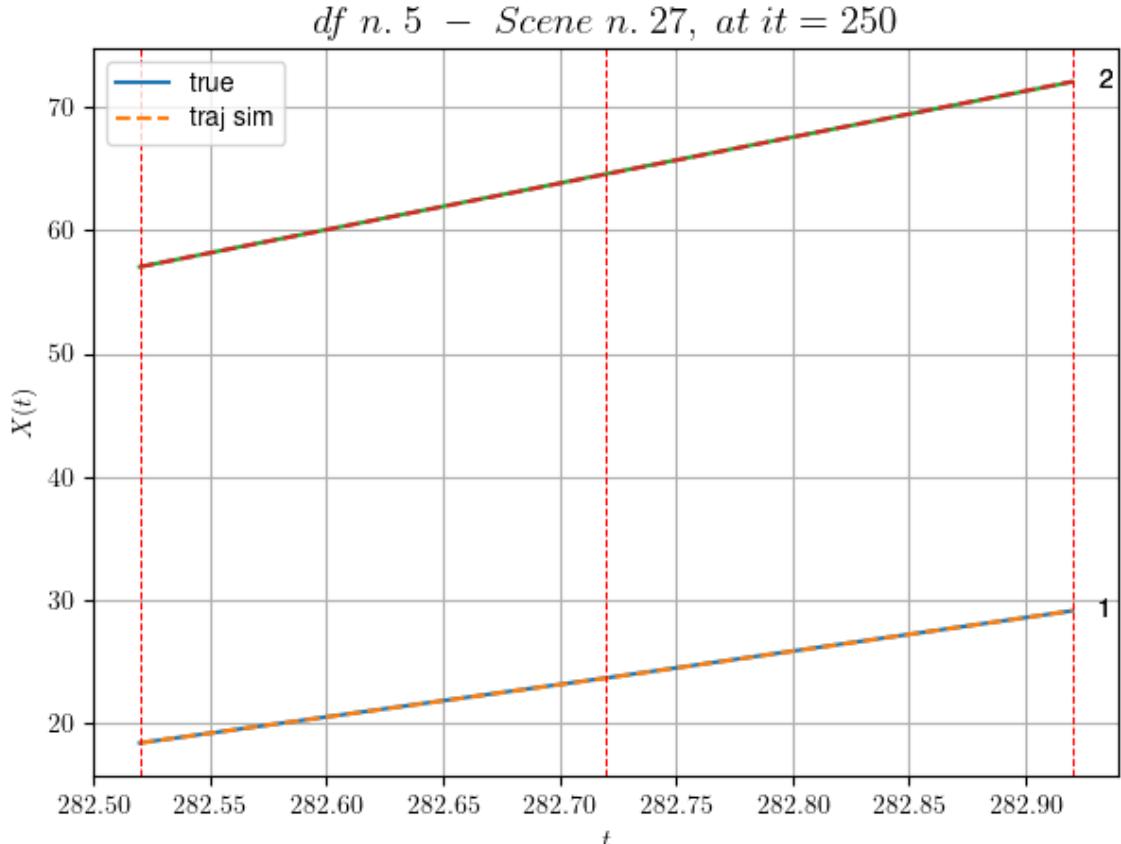


For scene 13/44:

* After LR finder: LR_NN=5e-05 with mse=1.9678751701133486
at it=24
* v0 = 25.93052748237487
* MSE = 0.16998488432183484
* iterations = 500

DataFrame n.5. Scene n.14/44

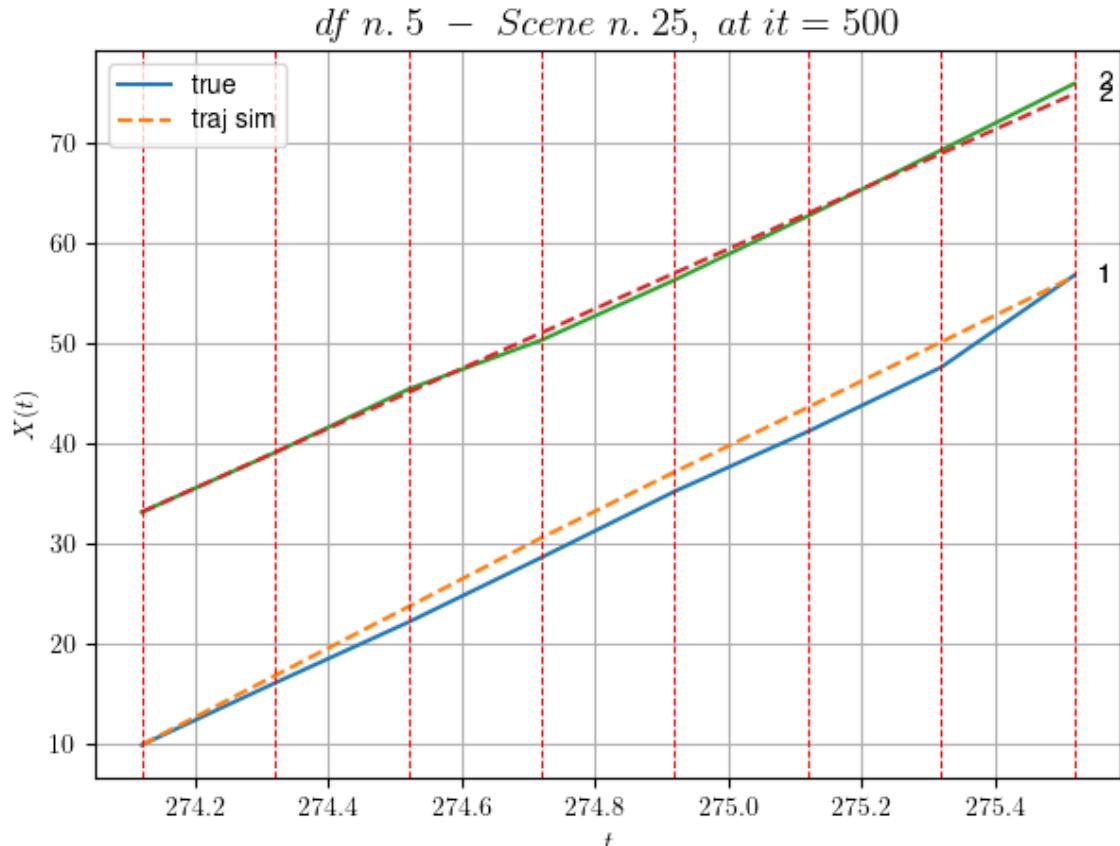
We have 2 time intervals inside [282.52,282.92]



For scene 14/44:
* After LR finder: LR_NN=5e-05 with mse=1.8832368286886958
at it=24
* v0 = 37.54118524558577
* MSE = 0.0002982712628474337
* iterations = 250

DataFrame n.5. Scene n.15/44

We have 7 time intervals inside [274.12,275.52]

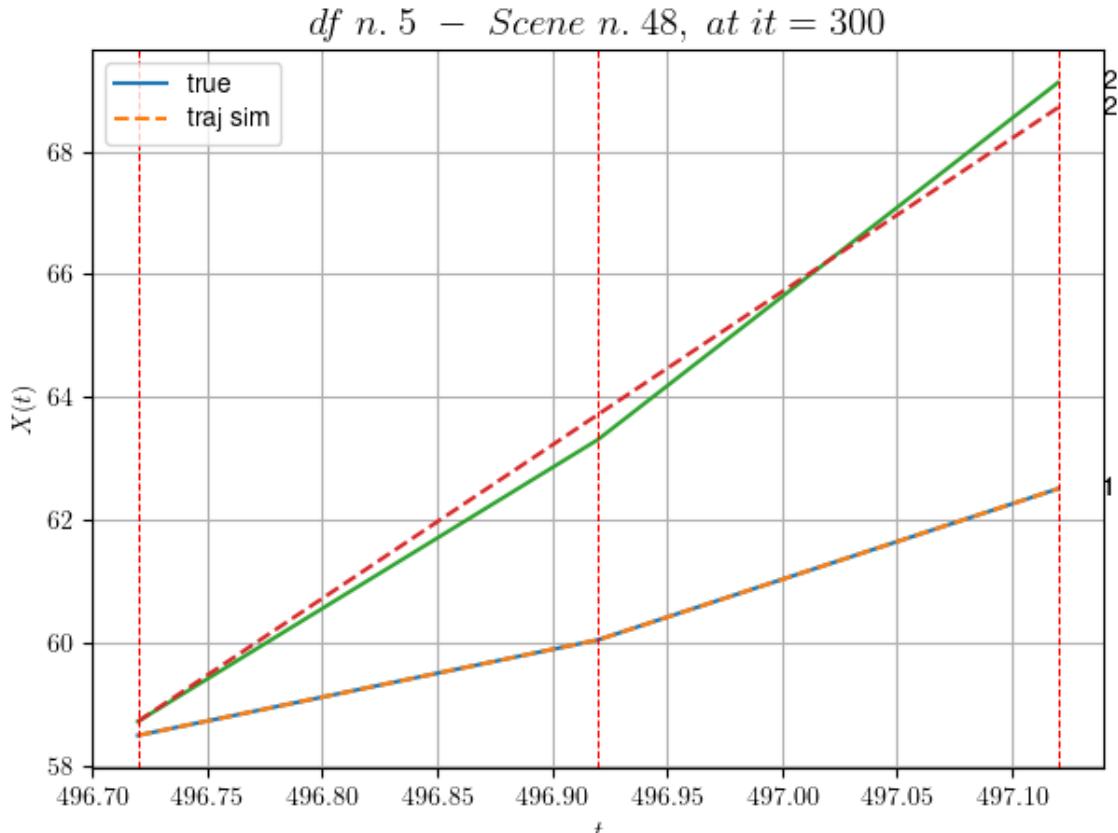


For scene 15/44:

* After LR finder: LR_NN=1e-05 with mse=1.069687333465148 at it=24
* v0 = 29.831436253446
* MSE = 0.6928181122915755
* iterations = 500

DataFrame n.5. Scene n.16/44

We have 2 time intervals inside [496.72,497.12]

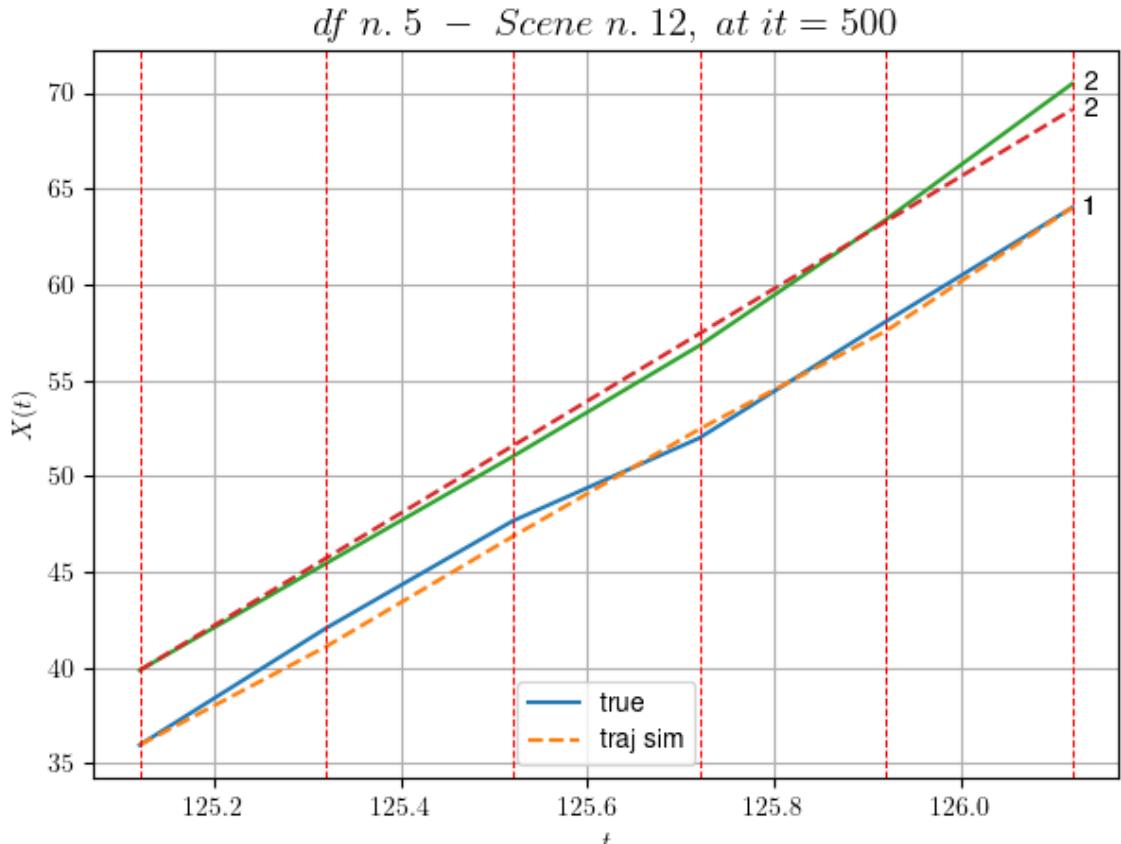


For scene 16/44:

* After LR finder: LR_NN=0.01 with mse=0.7495962523335769 at it=24
* v0 = 25.010967354282688
* MSE = 0.04997553036079629
* iterations = 300

DataFrame n.5. Scene n.17/44

We have 5 time intervals inside [125.12,126.12]

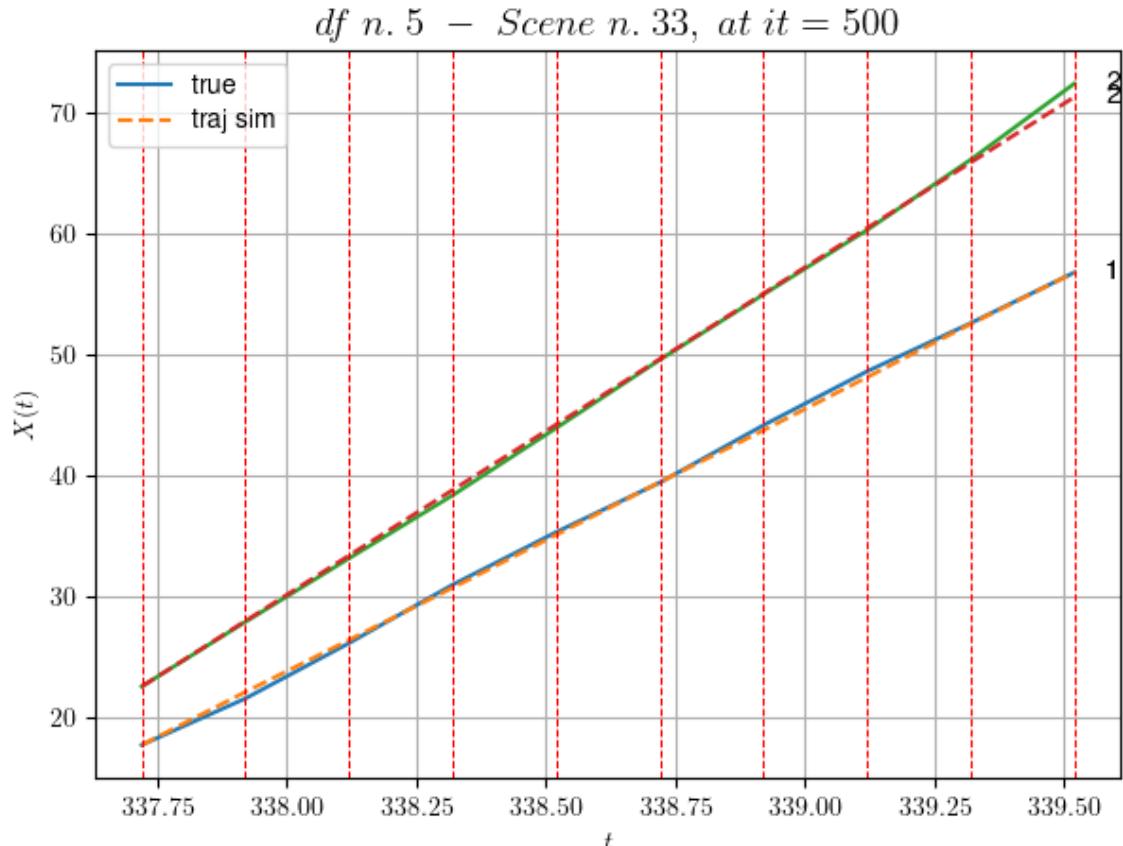


For scene 17/44:

* After LR finder: LR_NN=0.005 with mse=0.6902913500119051
at it=24
* v0 = 29.26921039472416
* MSE = 0.3622495661591434
* iterations = 500

DataFrame n.5. Scene n.18/44

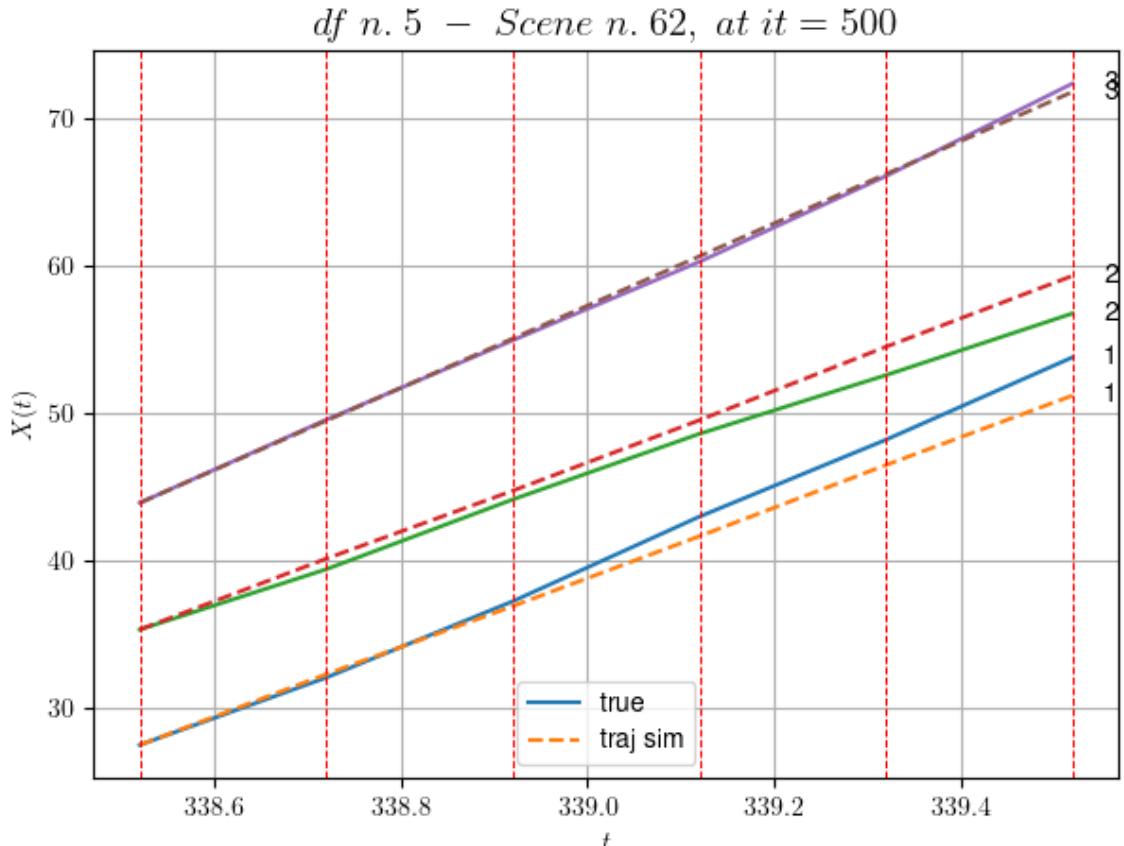
We have 9 time intervals inside [337.72,339.52]



For scene 18/44:
* After LR finder: LR_NN=0.001 with mse=11.813228475399804
at it=24
* v0 = 27.020038219088963
* MSE = 0.12705531134571796
* iterations = 500

DataFrame n.5. Scene n.19/44

We have 5 time intervals inside [338.52,339.52]

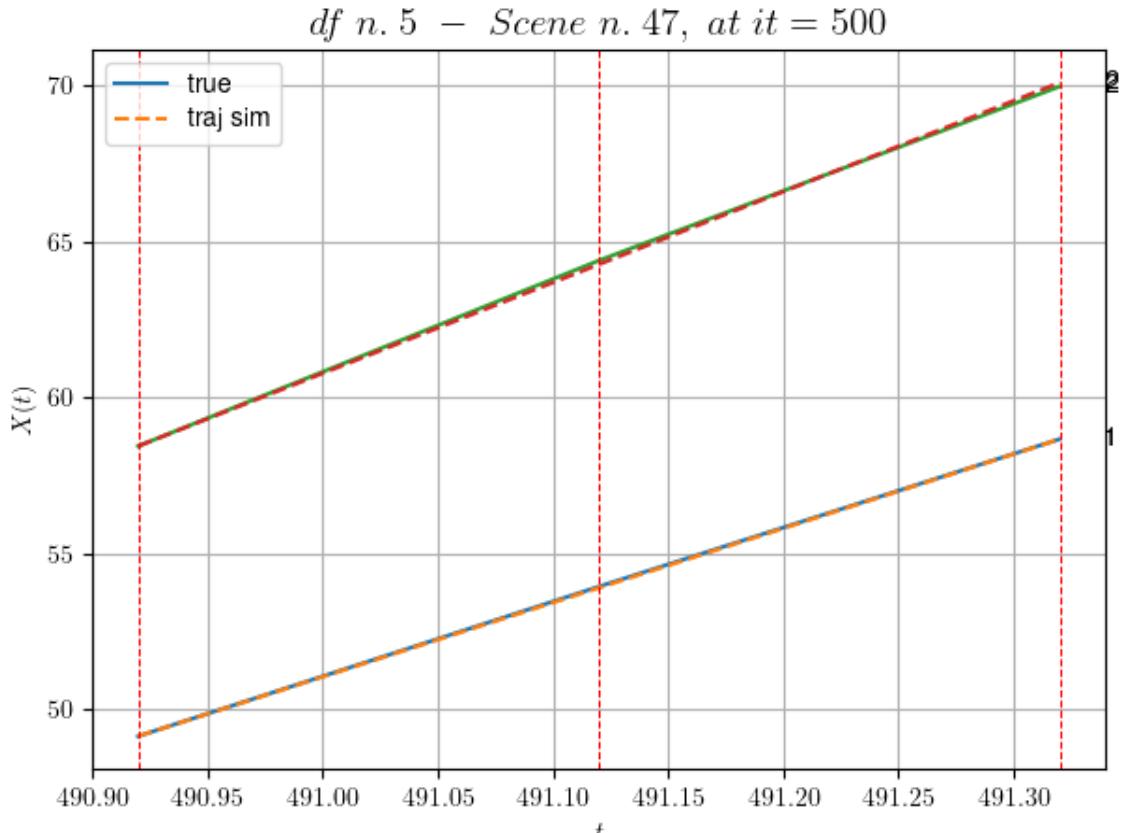


For scene 19/44:

* After LR finder: LR_NN=0.001 with mse=12.15175135609592 at it=24
* v0 = 27.853928426096
* MSE = 1.3308988644143132
* iterations = 500

DataFrame n.5. Scene n.20/44

We have 2 time intervals inside [490.92,491.32]

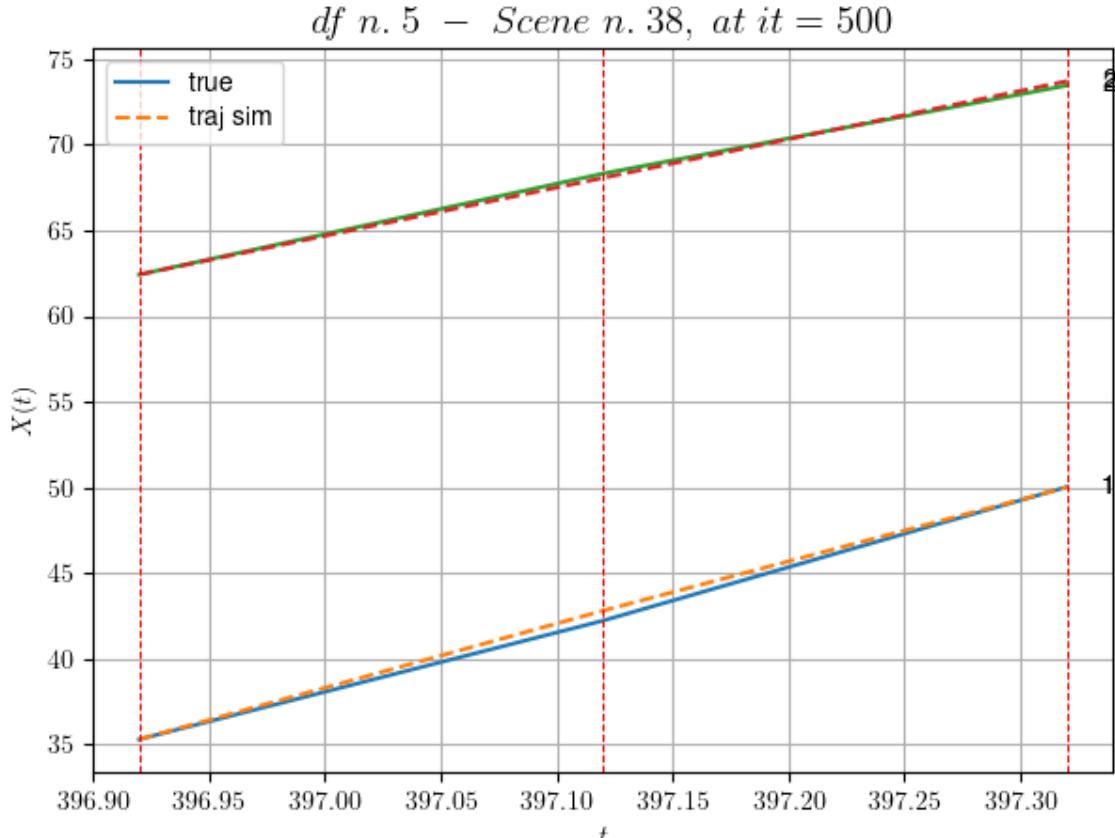


For scene 20/44:

* After LR finder: $LR_{NN}=0.0005$ with $mse=0.0665726290163103$
6 at it=24
* $v_0 = 29.115594759201358$
* $MSE = 0.005353642984226118$
* iterations = 500

DataFrame n.5. Scene n.21/44

We have 2 time intervals inside [396.92,397.32]

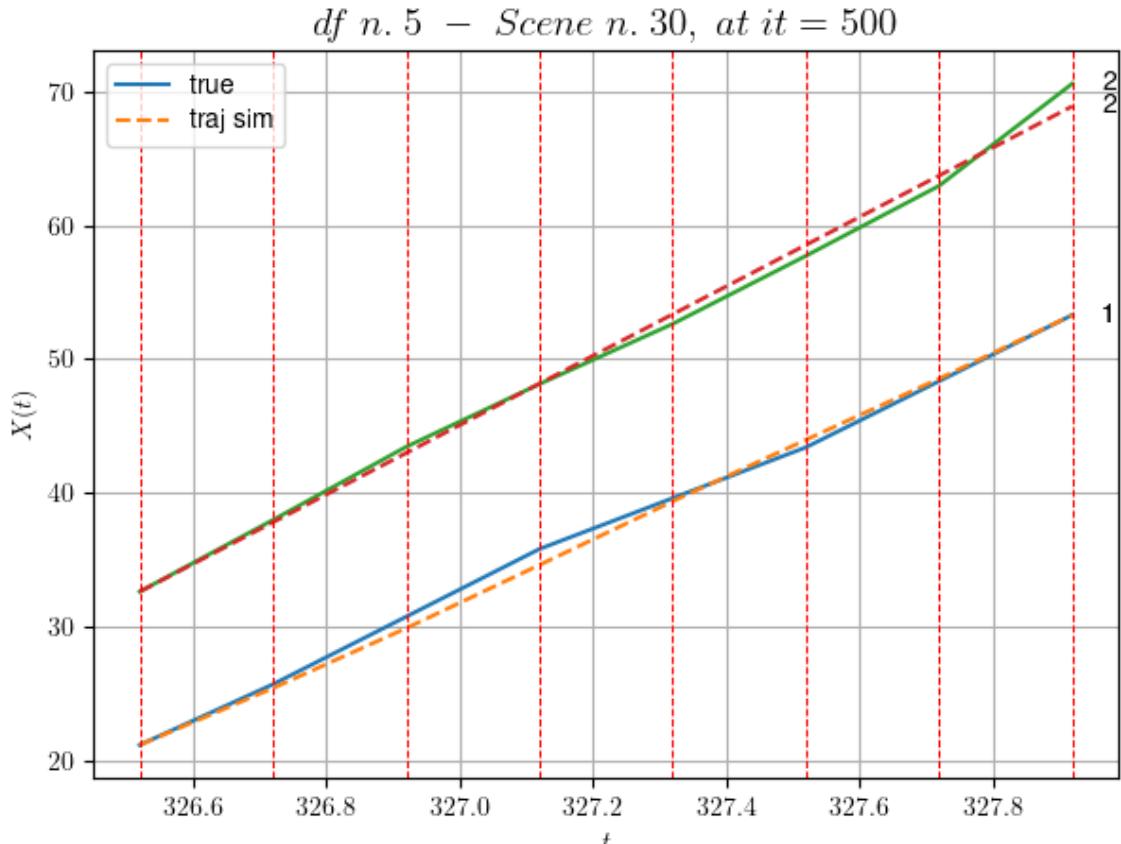


For scene 21/44:

* After LR finder: $LR_NN=5e-05$ with $mse=0.22347385941951353$
at it=24
* $v_0 = 28.239105392624353$
* $MSE = 0.07562859967638684$
* iterations = 500

DataFrame n.5. Scene n.22/44

We have 7 time intervals inside [326.52, 327.92]

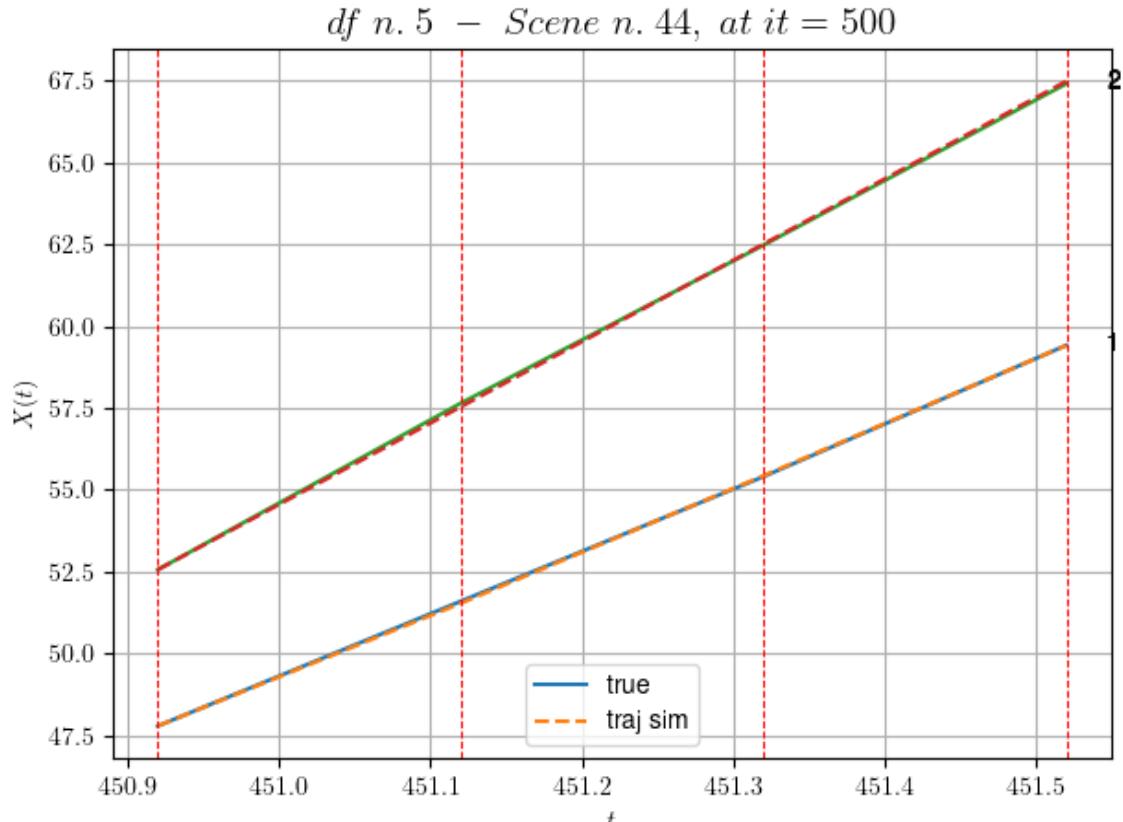


For scene 22/44:

* After LR finder: LR_NN=0.001 with mse=6.200457590541328 at it=24
* $v_0 = 25.910216862746346$
* MSE = 0.4108062536204252
* iterations = 500

DataFrame n.5. Scene n.23/44

We have 3 time intervals inside [450.92,451.52]

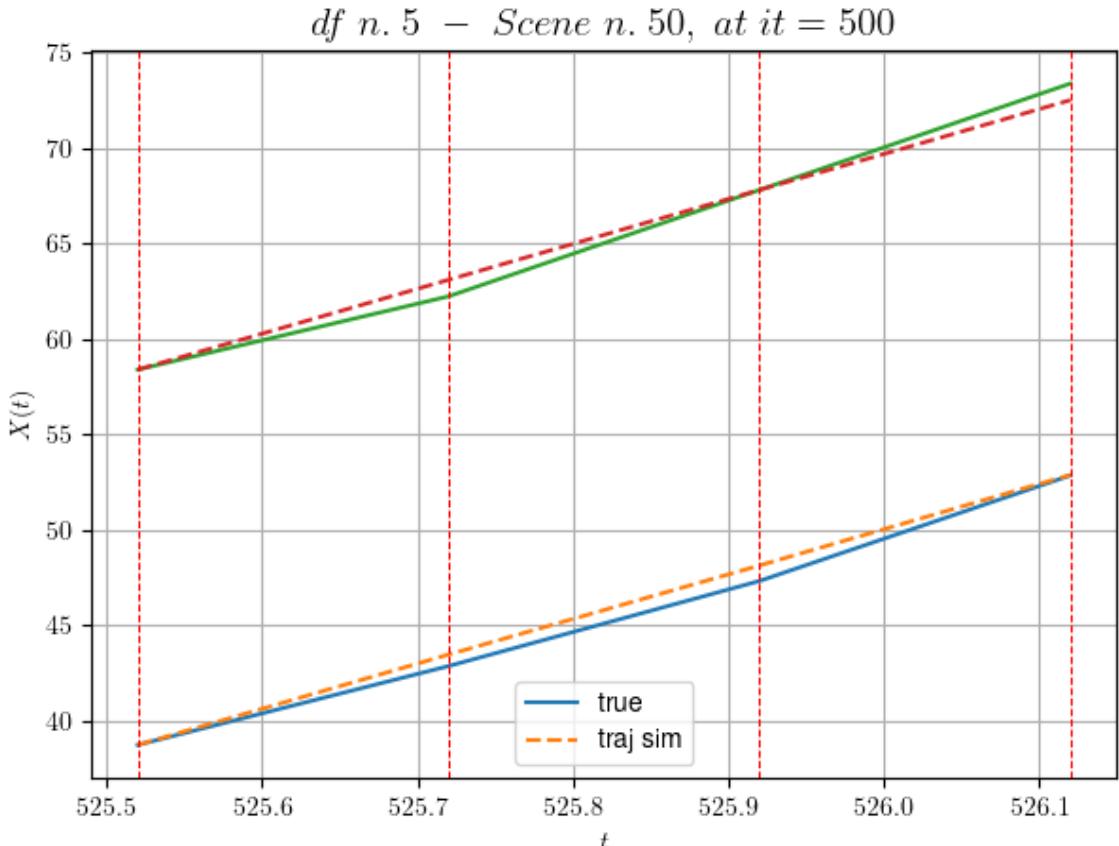


For scene 23/44:

* After LR finder: LR_NN=0.001 with mse=2.0600668382295124
at it=24
* v0 = 24.877482654595042
* MSE = 0.0029564935759152167
* iterations = 500

DataFrame n.5. Scene n.24/44

We have 3 time intervals inside [525.52,526.12]

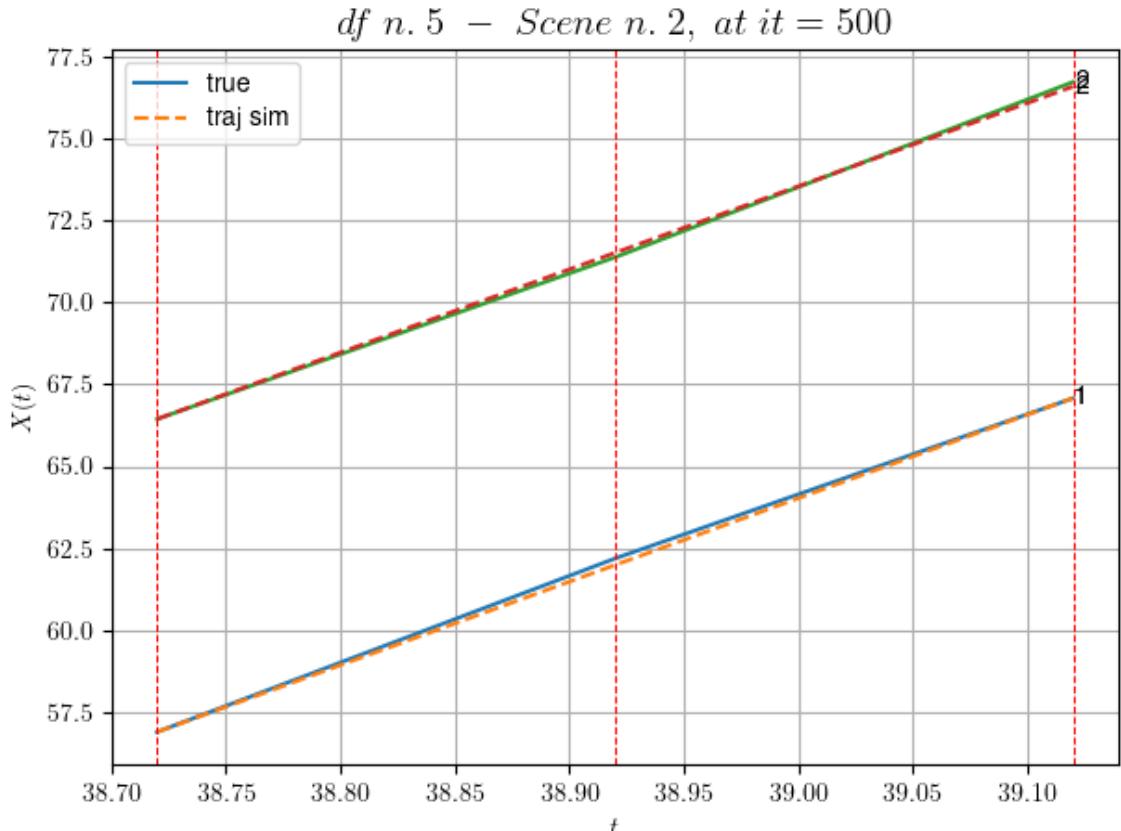


For scene 24/44:

* After LR finder: LR_NN=5e-05 with mse=2.6353128439559974
at it=24
* v0 = 23.539355454249755
* MSE = 0.29895592526355197
* iterations = 500

DataFrame n.5. Scene n.25/44

We have 2 time intervals inside [38.72,39.12]

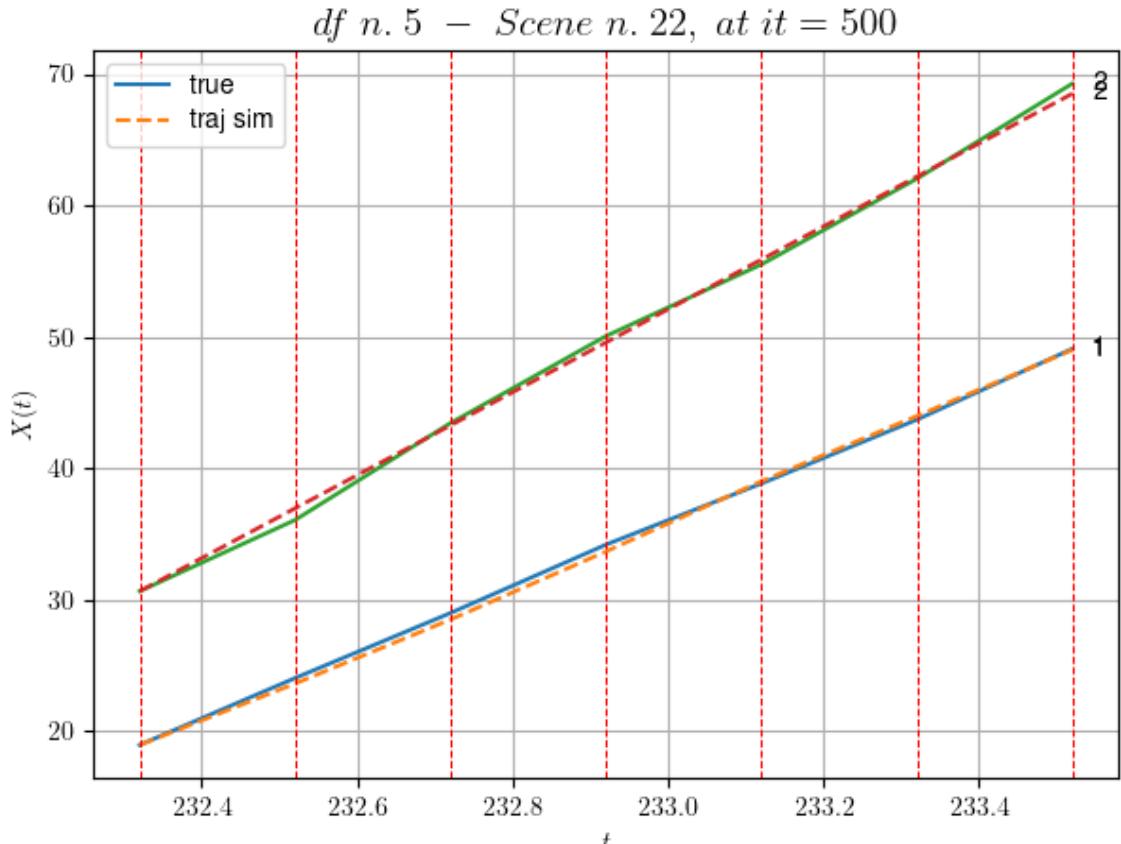


For scene 25/44:

* After LR finder: $LR_{NN}=0.0005$ with $mse=0.6807266299147685$
at $it=24$
* $v_0 = 25.372431967348867$
* $MSE = 0.012845341714301975$
* iterations = 500

DataFrame n.5. Scene n.26/44

We have 6 time intervals inside [232.32,233.52]



For scene 26/44:

* After LR finder: LR_NN=0.001 with mse=1.4414661544306142

at it=24

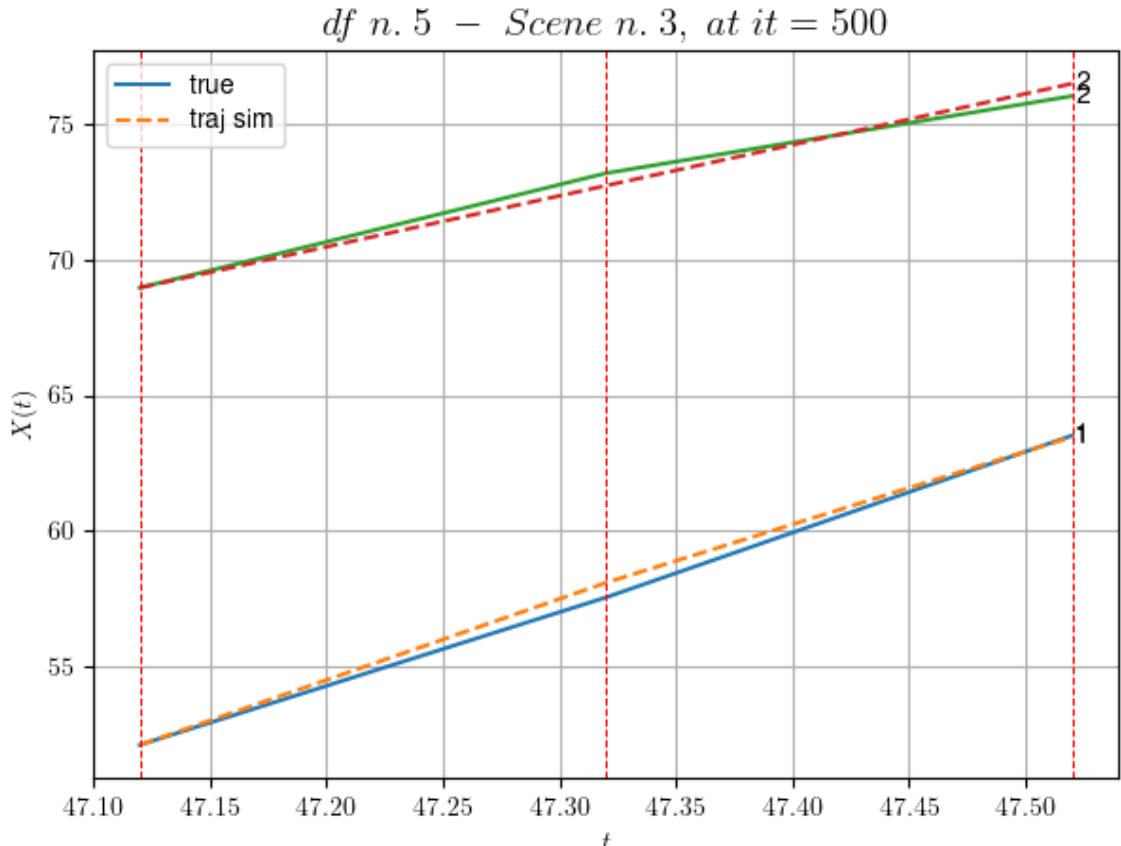
* v0 = 31.537257787030168

* MSE = 0.18723346353568068

* iterations = 500

DataFrame n.5. Scene n.27/44

We have 2 time intervals inside [47.12,47.52]

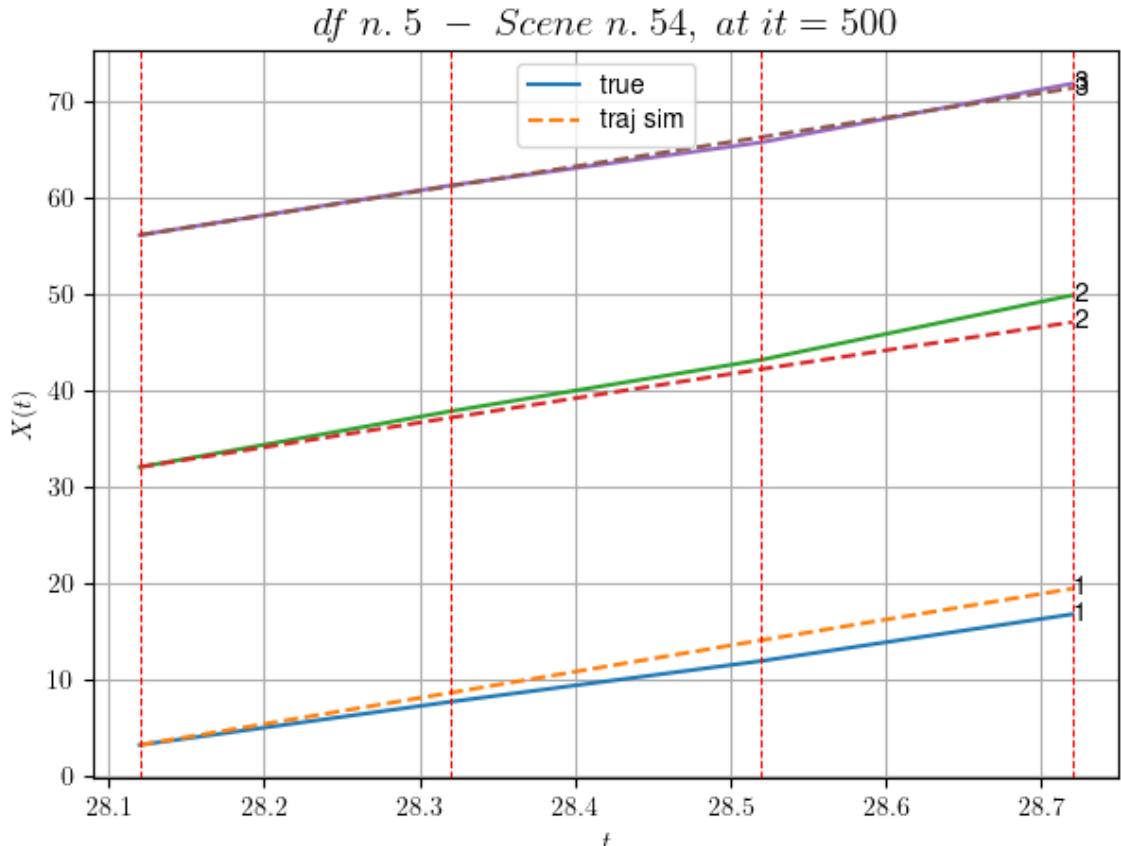


For scene 27/44:

* After LR finder: LR_NN=0.0005 with mse=4.758747475568623
at it=24
* v0 = 18.771821269963397
* MSE = 0.11569579007093792
* iterations = 500

DataFrame n.5. Scene n.28/44

We have 3 time intervals inside [28.12,28.72]

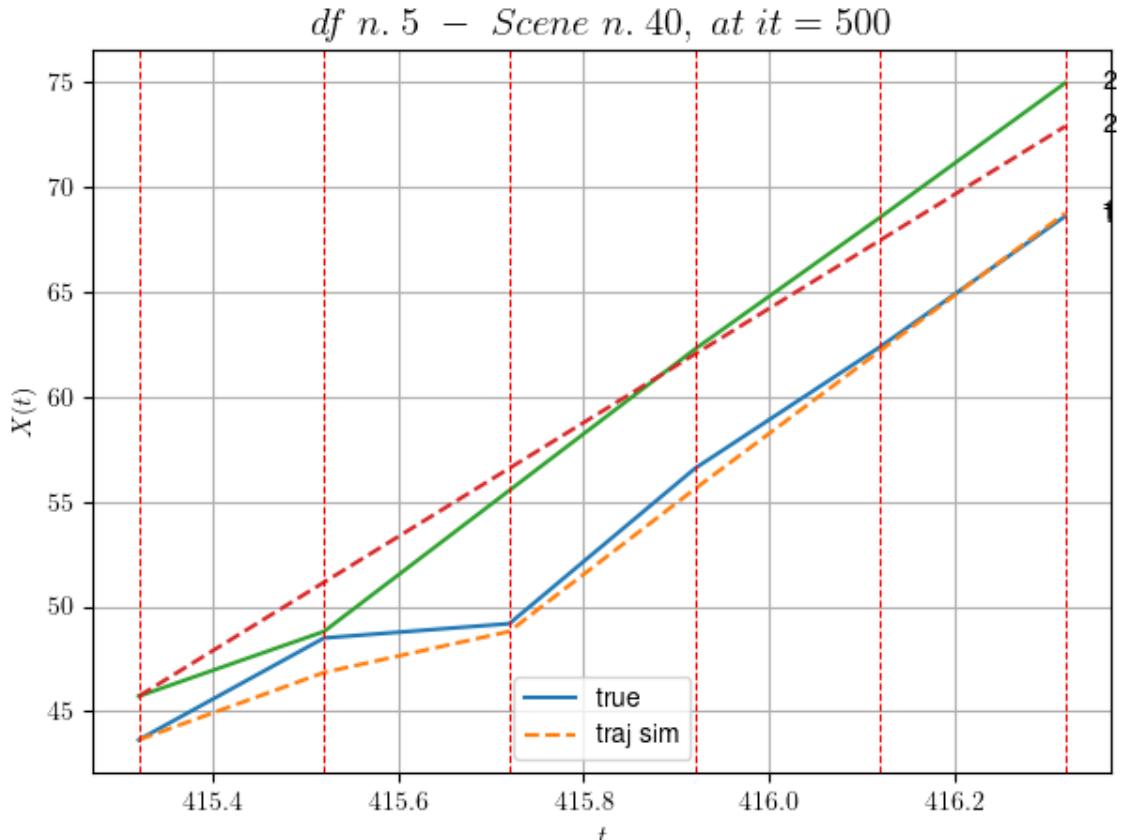


For scene 28/44:

* After LR finder: LR_NN=0.0001 with mse=4.752994532457774
at it=24
* v0 = 25.379383792483818
* MSE = 1.8533968608615108
* iterations = 500

DataFrame n.5. Scene n.29/44

We have 5 time intervals inside [415.32,416.32]

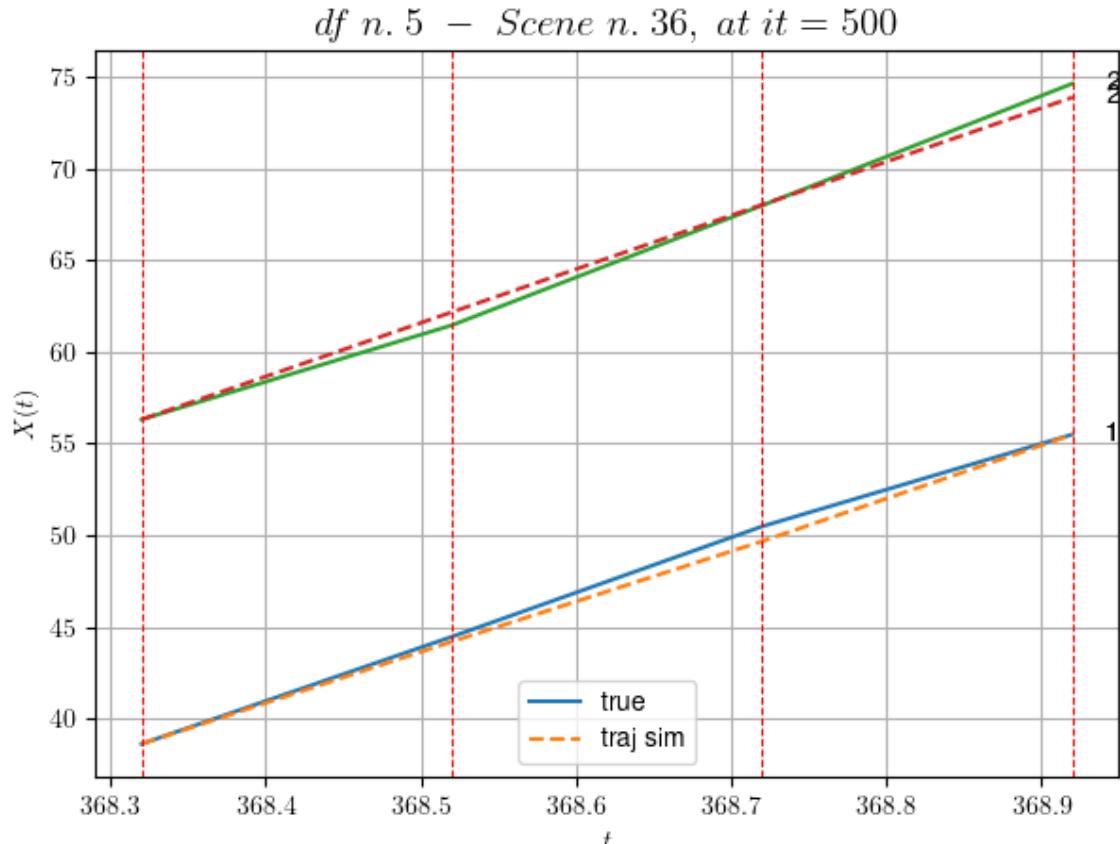


For scene 29/44:

```
* After LR finder: LR_NN=0.001 with mse=3.238837809718232 at it=24
* v0 = 27.188395316741122
* MSE = 1.2896585716349669
* iterations = 500
```

DataFrame n.5. Scene n.30/44

We have 3 time intervals inside [368.32, 368.92]

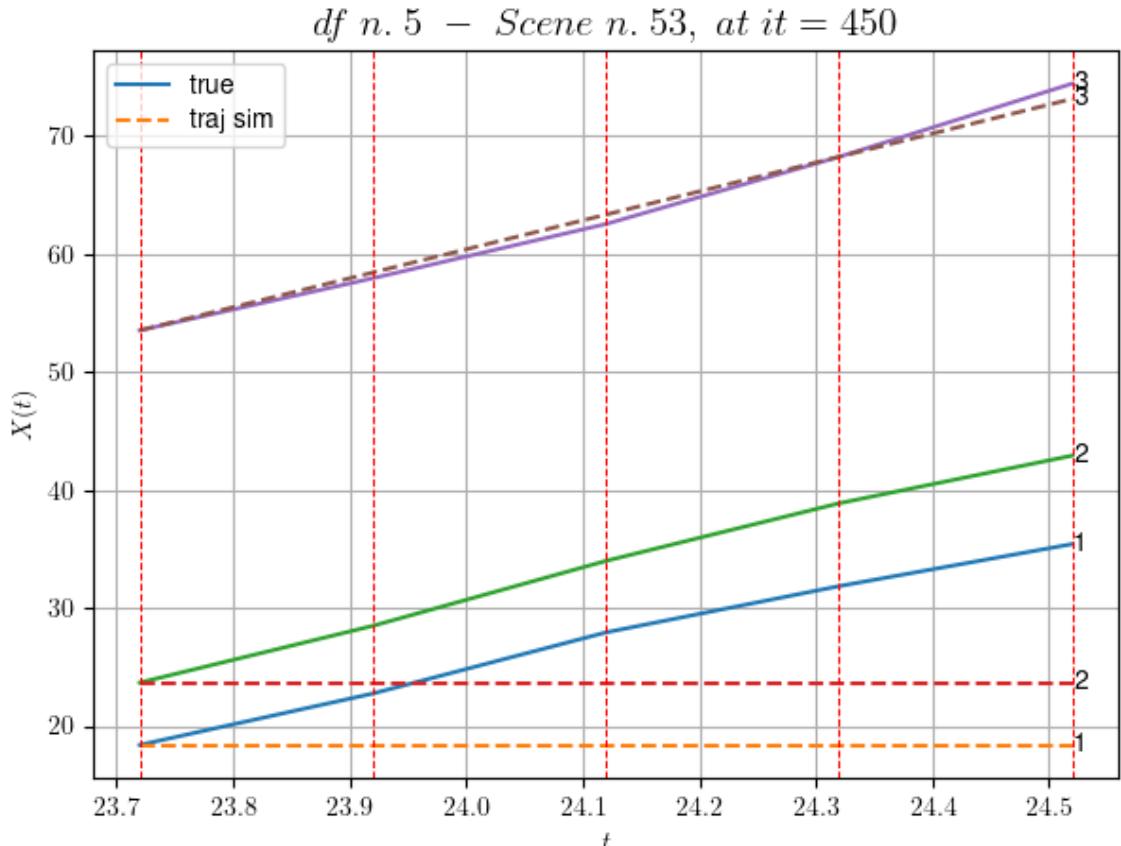


For scene 30/44:

* After LR finder: LR_NN=0.0001 with mse=0.1951687177509509
at it=24
* $v_0 = 29.29813929812574$
* MSE = 0.20955825253986027
* iterations = 500

DataFrame n.5. Scene n.31/44

We have 4 time intervals inside [23.72, 24.52]



For scene 31/44:

* After LR finder: LR_NN=0.001 with mse=19.757757689182508

at it=24

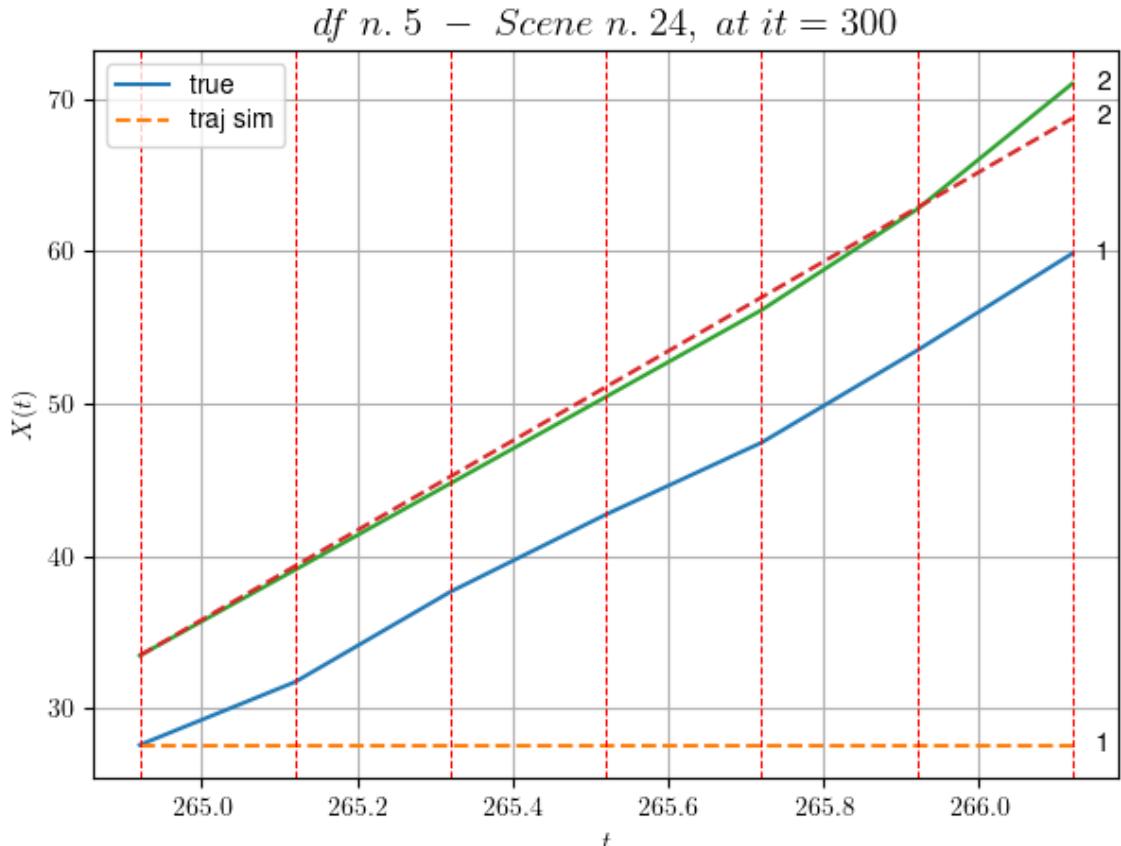
* v0 = 24.53480482790778

* MSE = 28.771025087933022

* iterations = 450

DataFrame n.5. Scene n.32/44

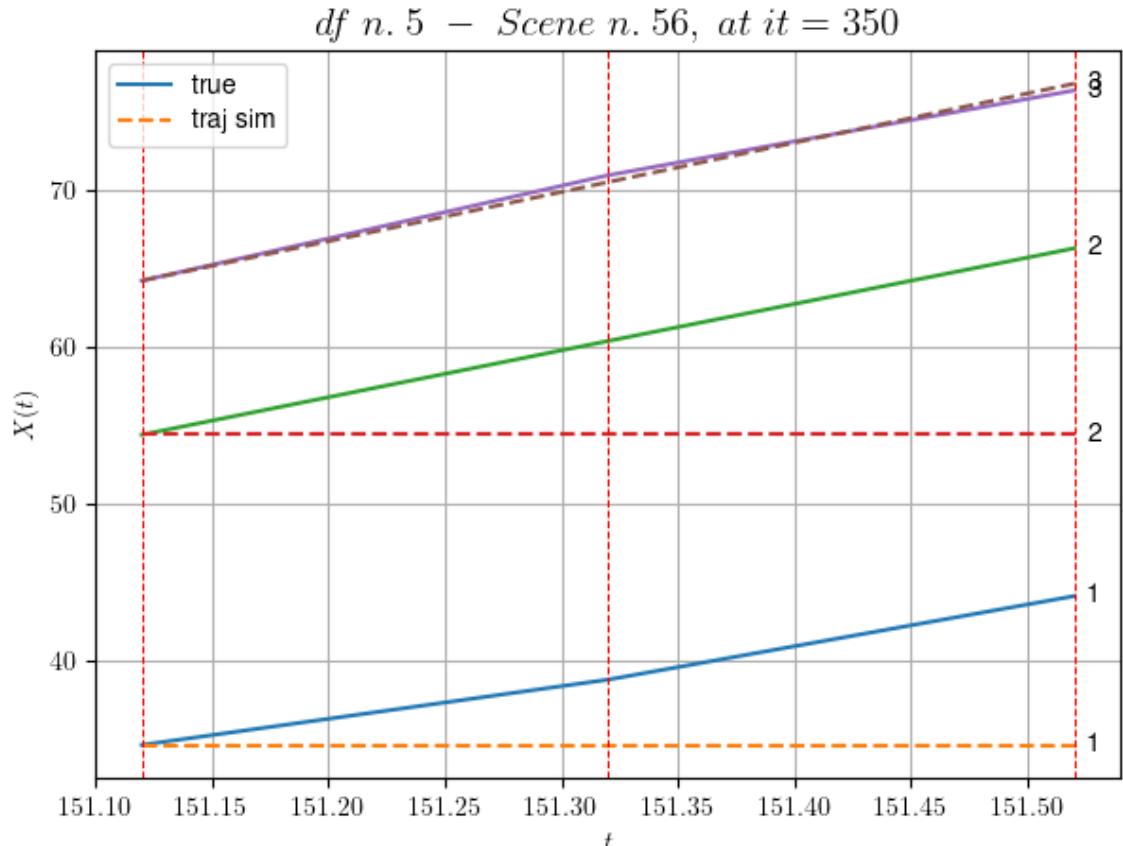
We have 6 time intervals inside [264.92,266.12]



For scene 32/44:
* After LR finder: LR_NN=0.0001 with mse=0.5460920155358551
at it=24
* v0 = 29.366788512520788
* MSE = 175.3056257907334
* iterations = 300

DataFrame n.5. Scene n.33/44

We have 2 time intervals inside [151.12,151.52]

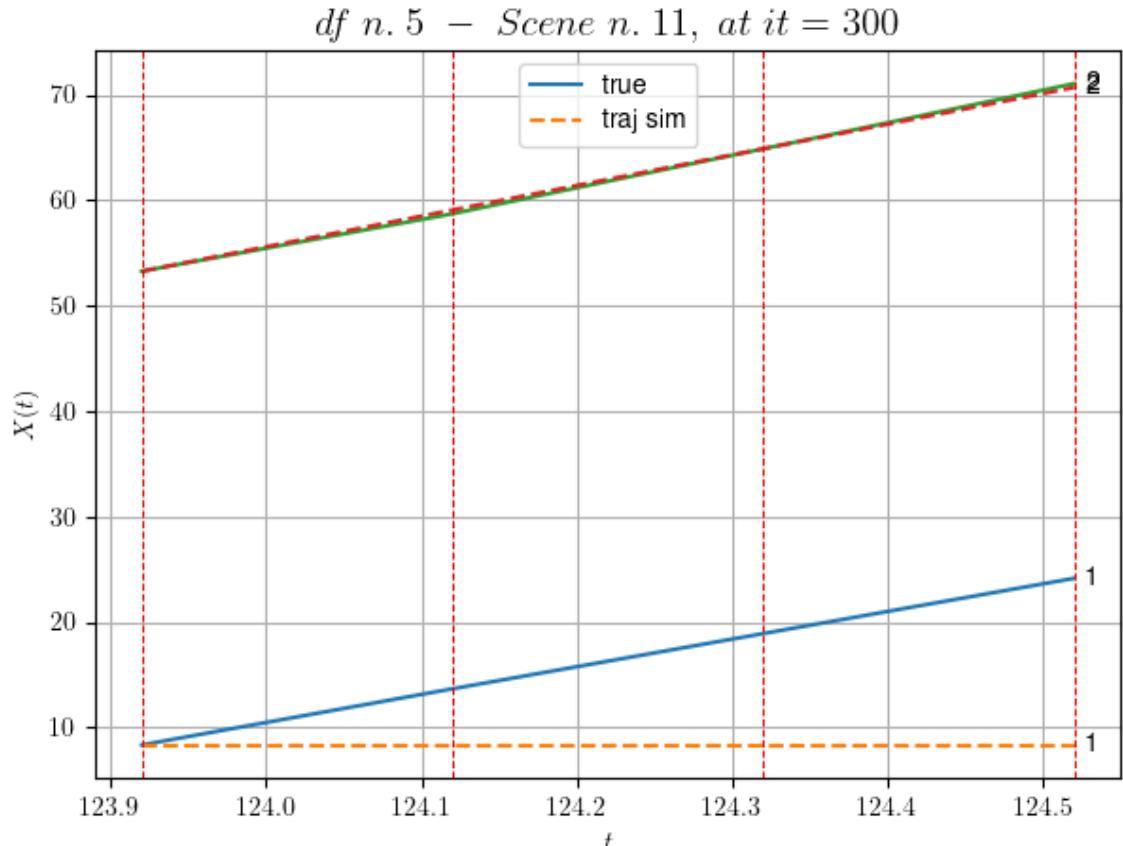


For scene 33/44:

* After LR finder: LR_NN=0.0005 with mse=5.759771332290641
at it=24
* v0 = 31.516127782593923
* MSE = 31.839491309757687
* iterations = 350

DataFrame n.5. Scene n.34/44

We have 3 time intervals inside [123.92,124.52]

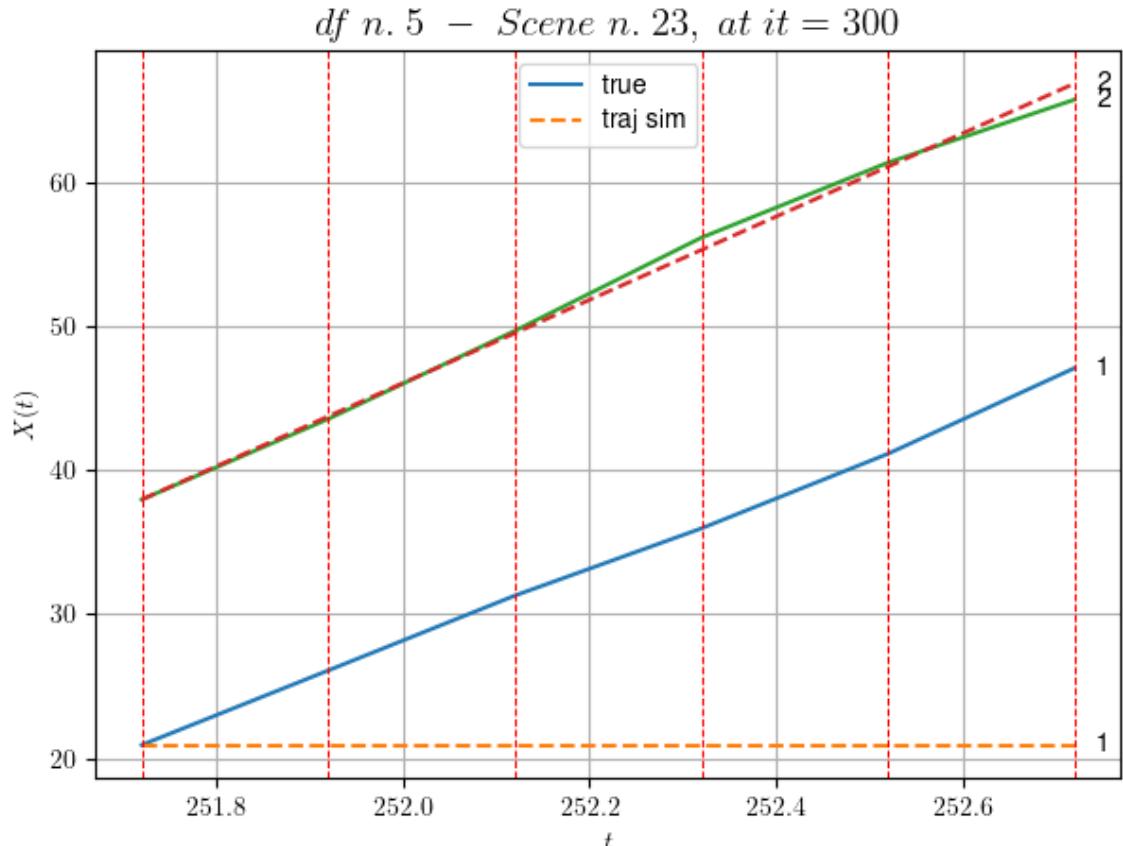


For scene 34/44:

* After LR finder: LR_NN=5e-05 with mse=0.06352241174064527
at it=24
* v0 = 29.067105226311437
* MSE = 48.7950836915268
* iterations = 300

DataFrame n.5. Scene n.35/44

We have 5 time intervals inside [251.72,252.72]



For scene 35/44:

* After LR finder: LR_NN=0.001 with mse=0.5098650532409454

at it=24

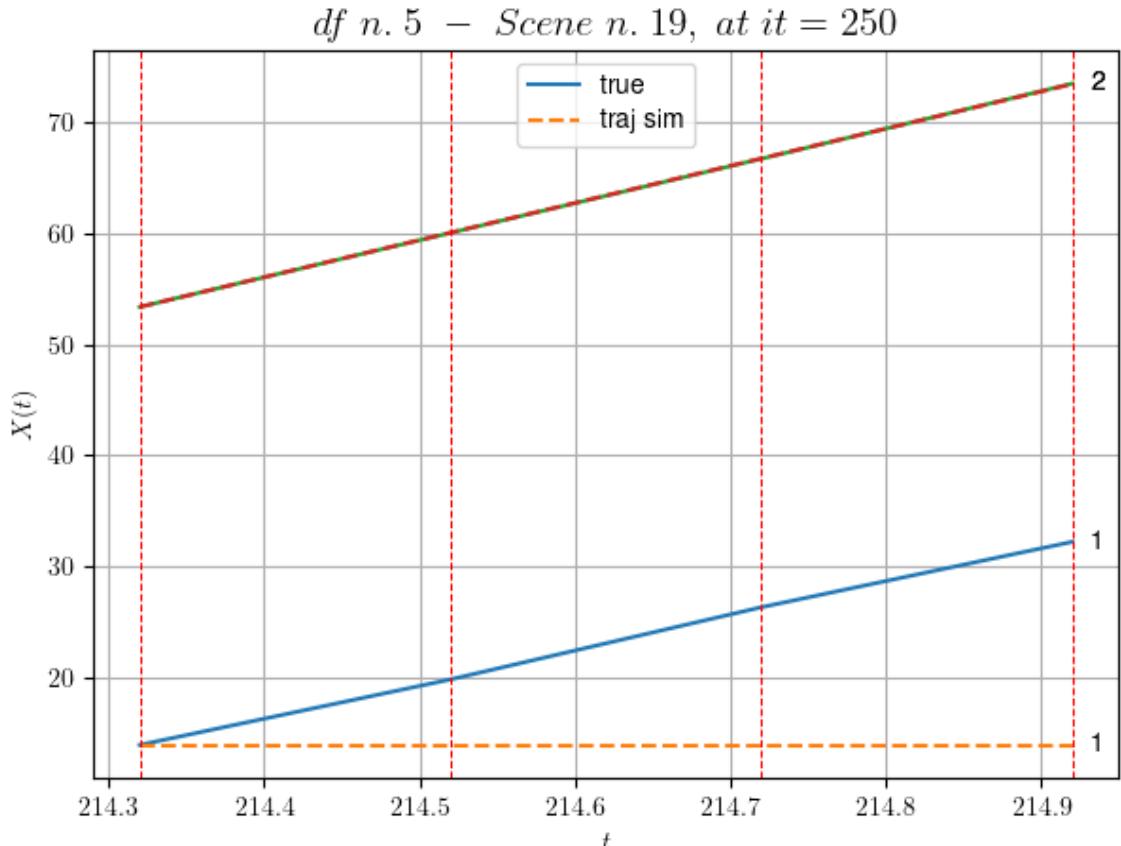
* v0 = 28.911332192194422

* MSE = 121.49562641761248

* iterations = 300

DataFrame n.5. Scene n.36/44

We have 3 time intervals inside [214.32,214.92]

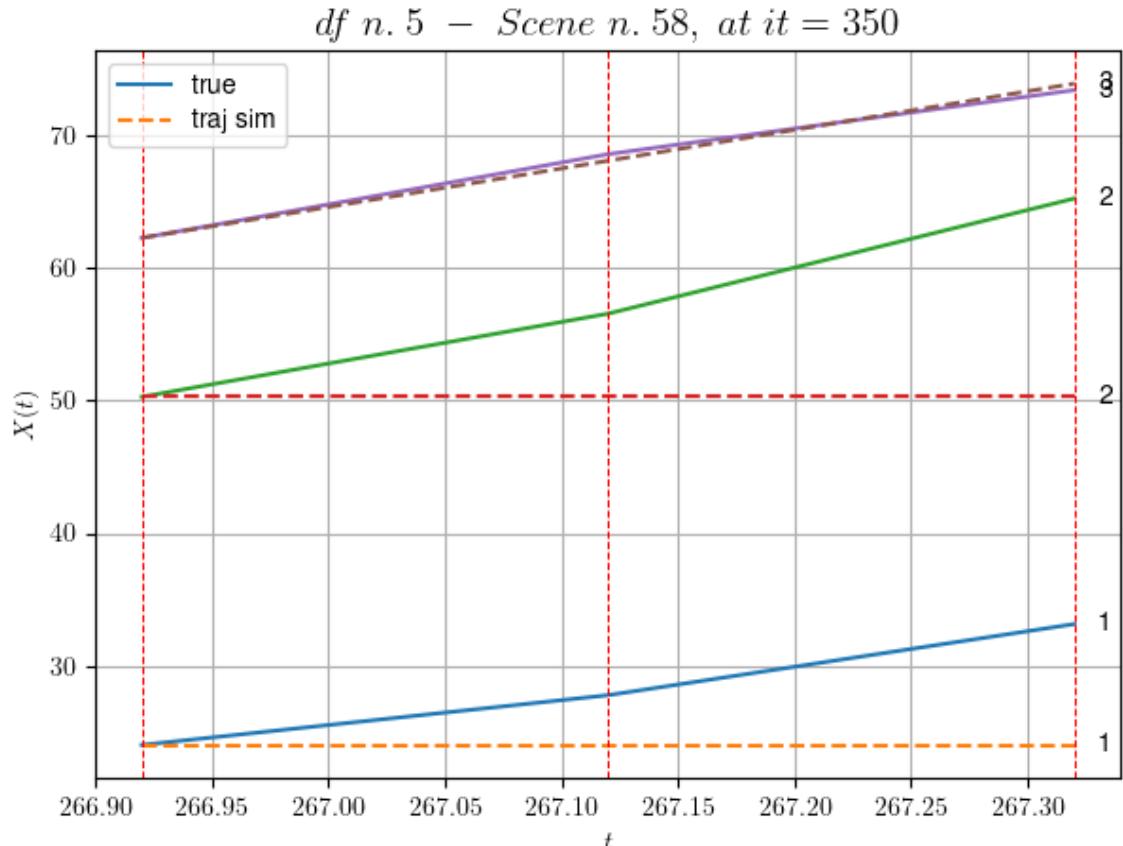


For scene 36/44:

* After LR finder: LR_NN=0.0001 with mse=0.8509676290203108
at it=24
* v0 = 33.41664171121789
* MSE = 65.29676693050406
* iterations = 250

DataFrame n.5. Scene n.37/44

We have 2 time intervals inside [266.92,267.32]

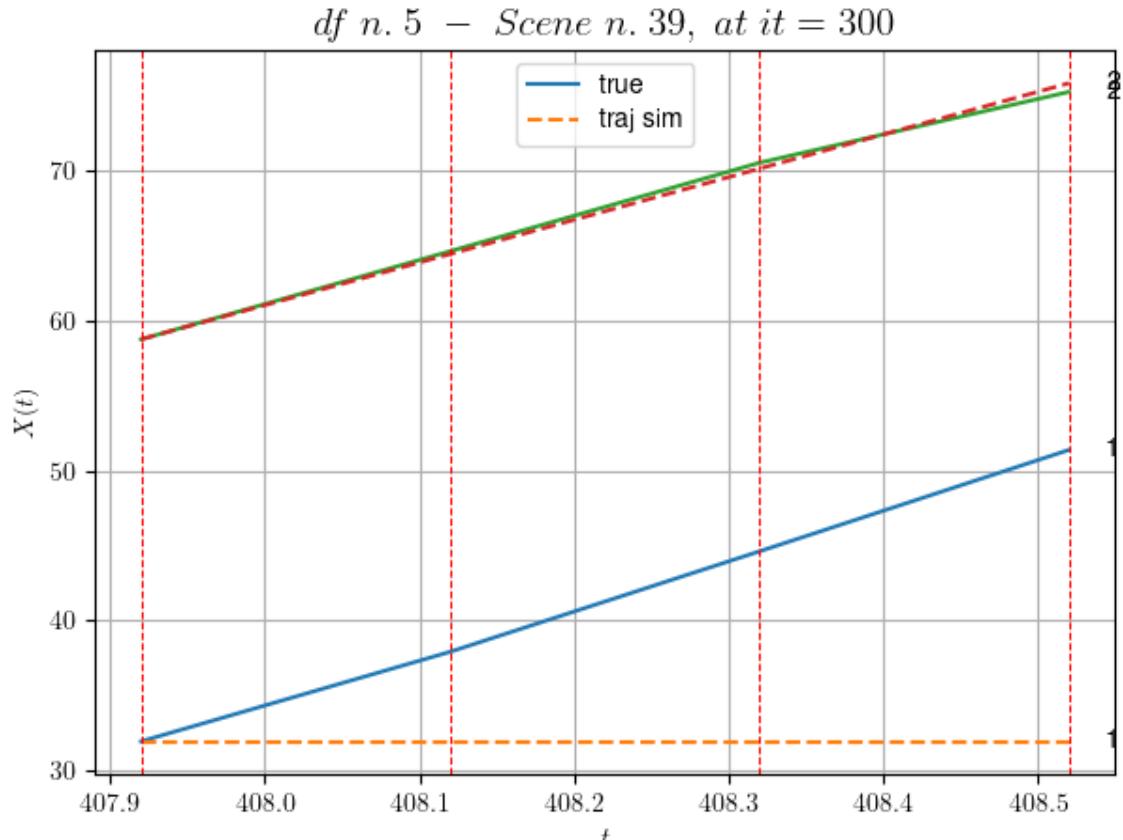


For scene 37/44:

* After LR finder: LR_NN=0.0005 with mse=13.523448867590124
at it=24
* v0 = 29.085708232493097
* MSE = 40.03434181903818
* iterations = 350

DataFrame n.5. Scene n.38/44

We have 3 time intervals inside [407.92,408.52]

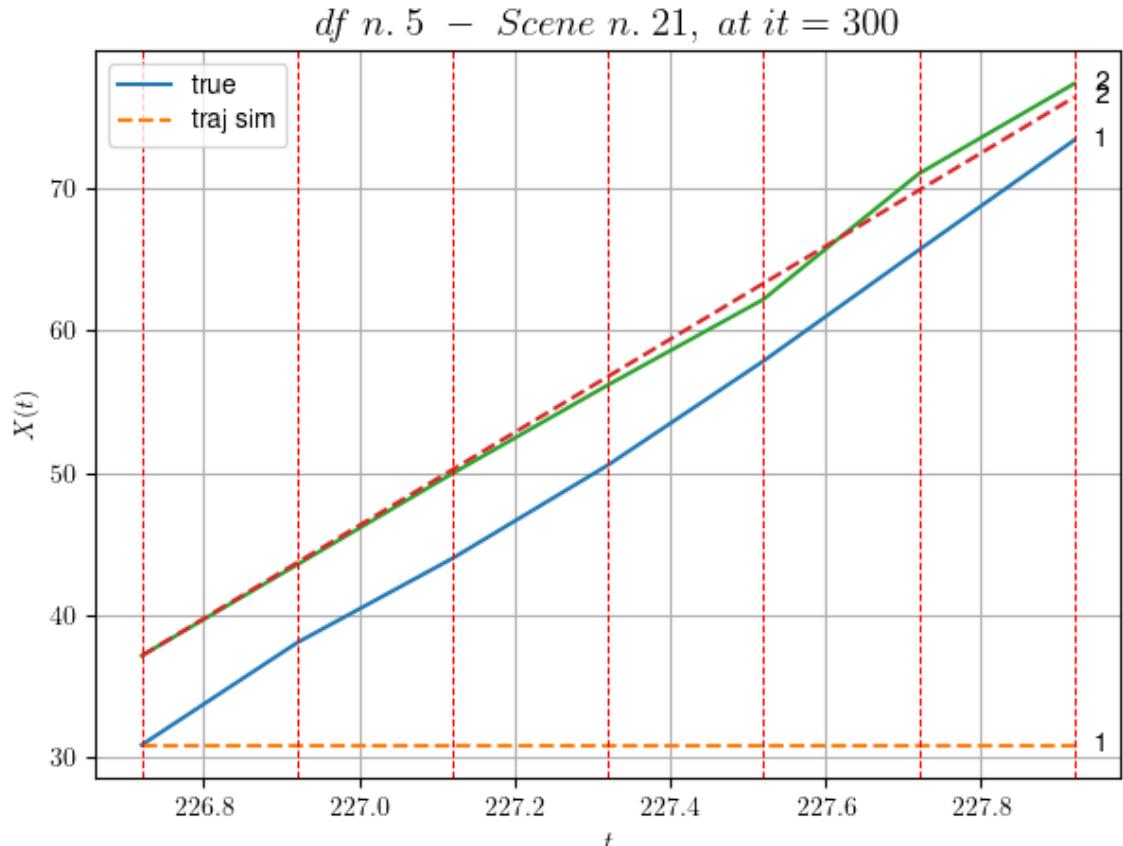


For scene 38/44:

* After LR finder: $LR_NN=5e-05$ with $mse=0.36543810627908674$
at it=24
* $v_0 = 28.450687700563787$
* $MSE = 71.72366085629471$
* iterations = 300

DataFrame n.5. Scene n.39/44

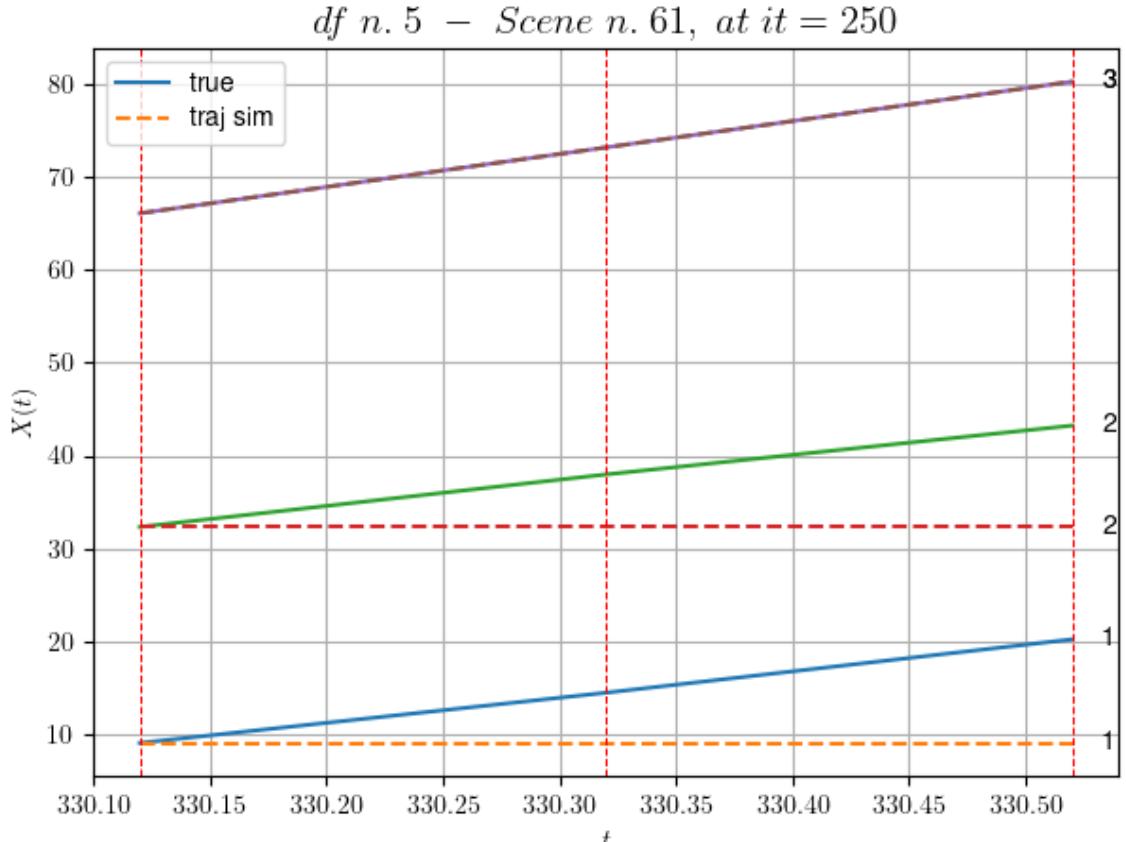
We have 6 time intervals inside [226.72, 227.92]



For scene 39/44:
* After LR finder: LR_NN=0.001 with mse=3.6429245951087017
at it=24
* v0 = 32.69366399119471
* MSE = 311.0862144518503
* iterations = 300

DataFrame n.5. Scene n.40/44

We have 2 time intervals inside [330.12,330.52]

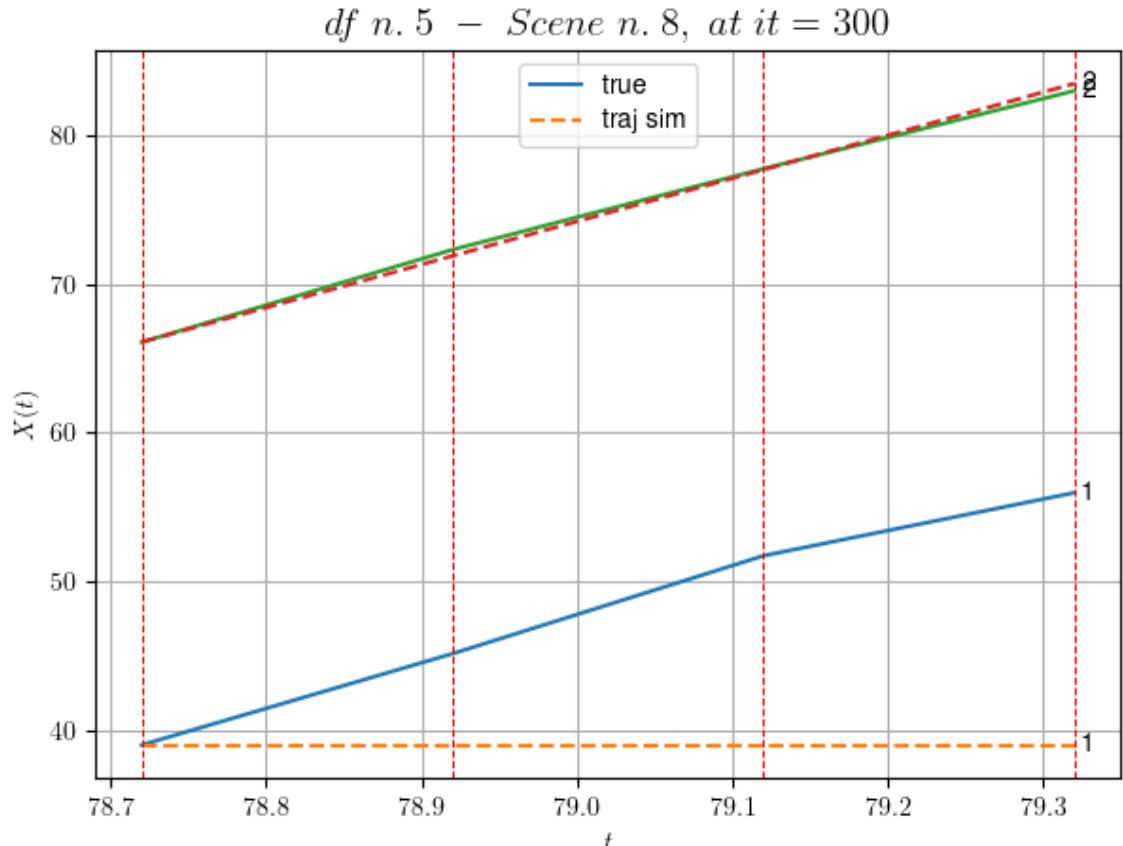


For scene 40/44:

* After LR finder: LR_NN=5e-05 with mse=1.867664423736576 at it=24
* v0 = 35.47750160163083
* MSE = 33.89800470930249
* iterations = 250

DataFrame n.5. Scene n.41/44

We have 3 time intervals inside [78.72,79.32]



For scene 41/44:

* After LR finder: LR_NN=5e-05 with mse=0.4499520643128499

at it=24

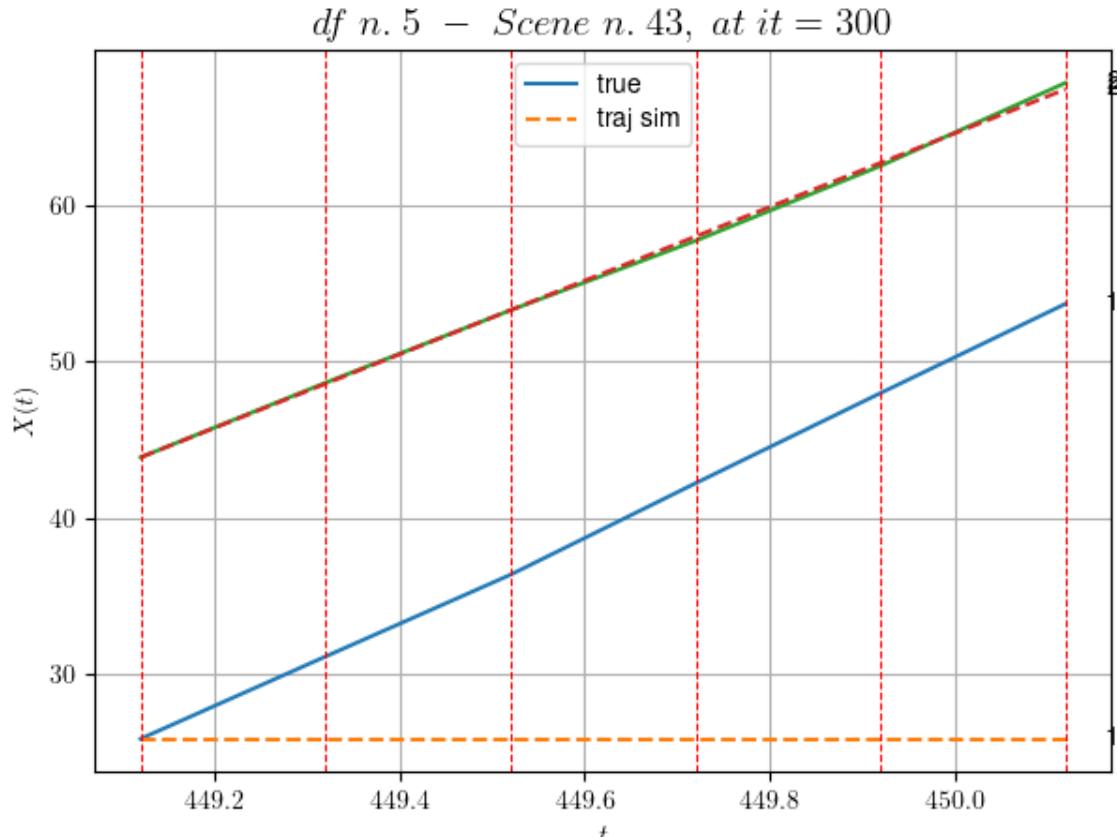
* v0 = 28.965407521613415

* MSE = 60.87943884838522

* iterations = 300

DataFrame n.5. Scene n.42/44

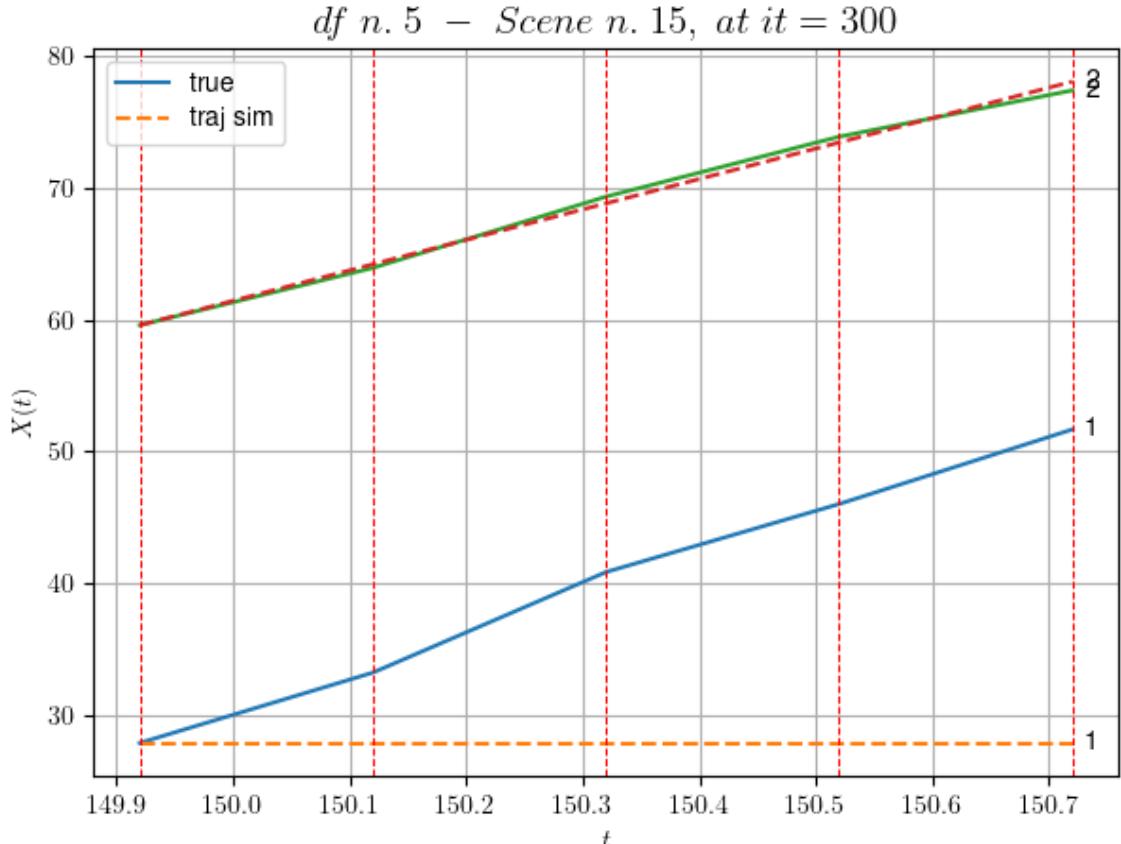
We have 5 time intervals inside [449.12,450.12]



For scene 42/44:
* After LR finder: LR_NN=5e-05 with mse=8.004365976764403 at
it=24
* v0 = 23.527605689596555
* MSE = 138.83091167179325
* iterations = 300

DataFrame n.5. Scene n.43/44

We have 4 time intervals inside [149.92, 150.72]

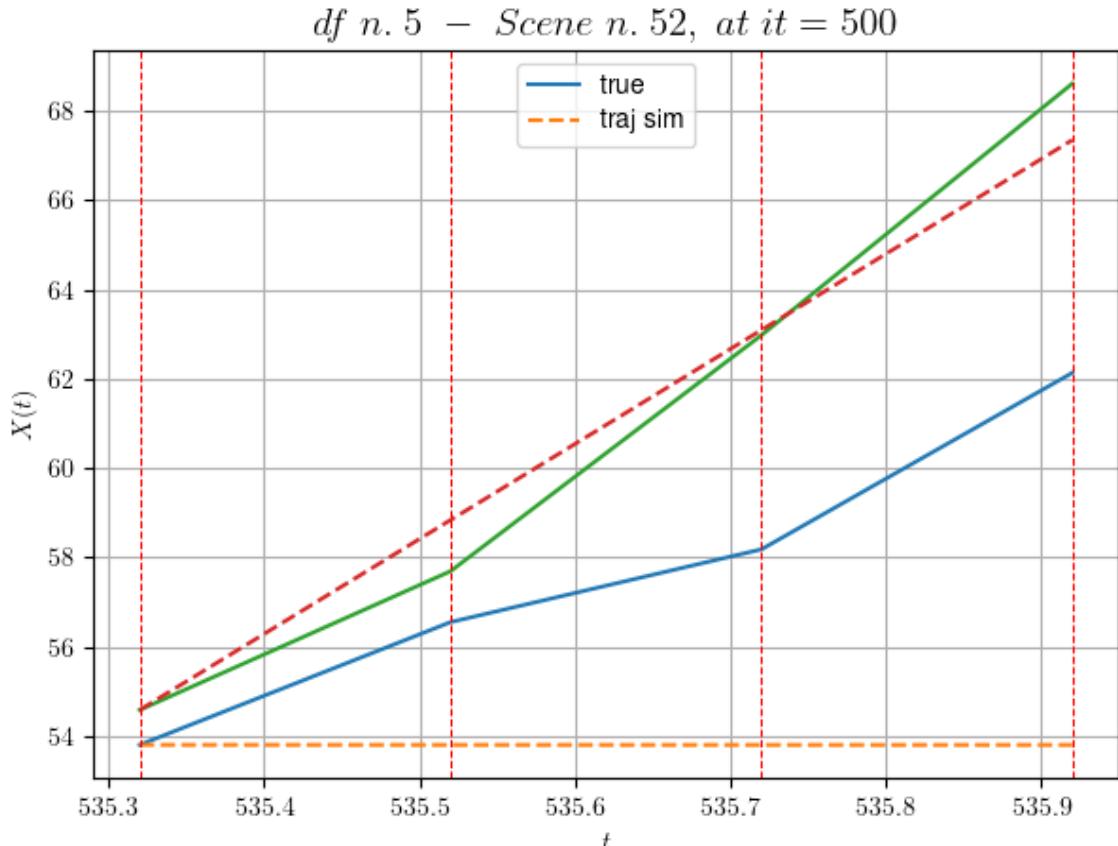


For scene 43/44:

* After LR finder: LR_NN=5e-05 with mse=6.129781454356363 at it=24
* v0 = 23.10299509098039
* MSE = 109.18836754807184
* iterations = 300

DataFrame n.5. Scene n.44/44

We have 3 time intervals inside [535.32,535.92]



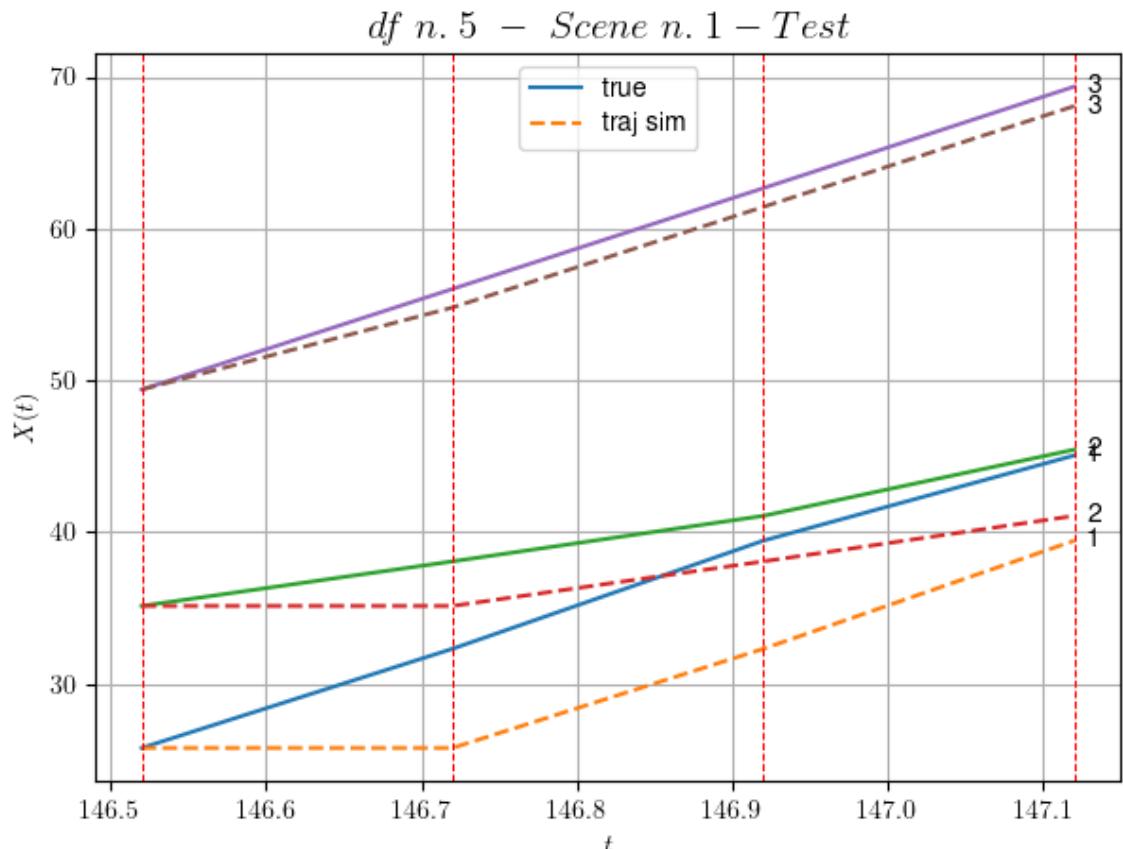
For scene 44/44:

* After LR finder: LR_NN=0.01 with mse=4.744266937229452 at
it=24
* v0 = 21.278077520483933
* MSE = 12.356268066798181
* iterations = 500

MSE train: 30.27813677882043

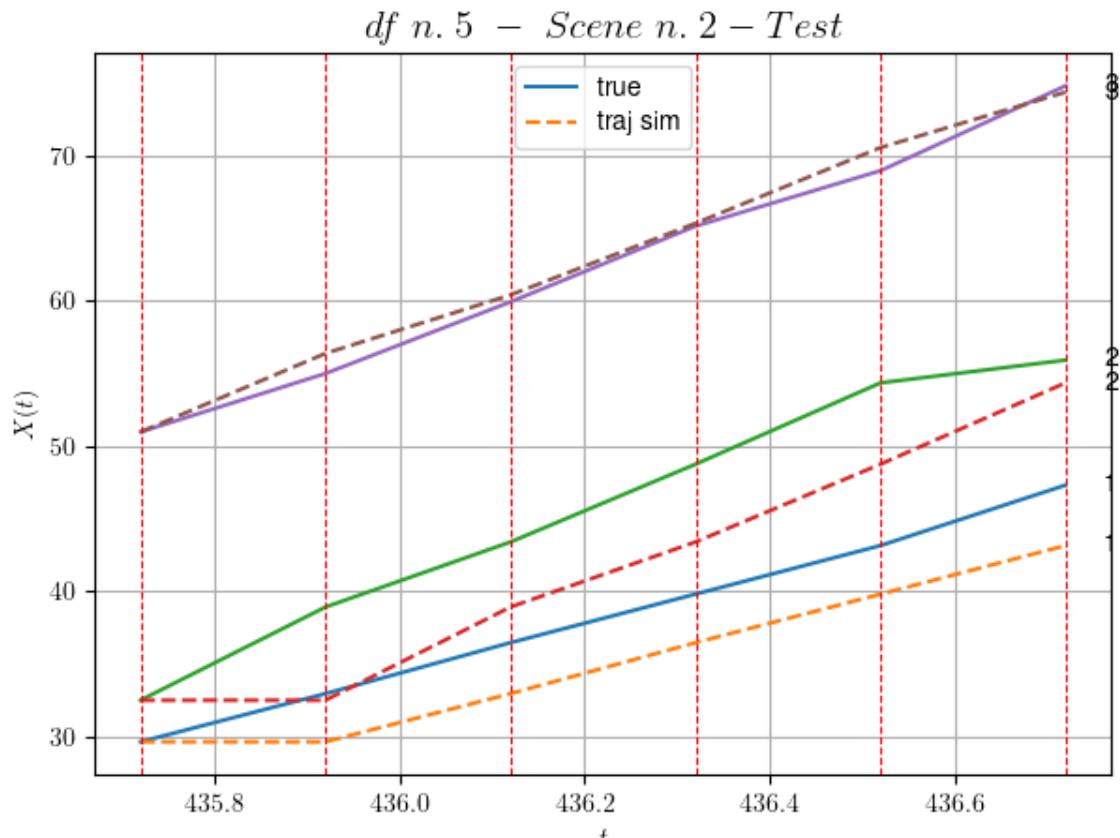
Testing step. (22 scenes)

DataFrame n.5. Scene n.1/22



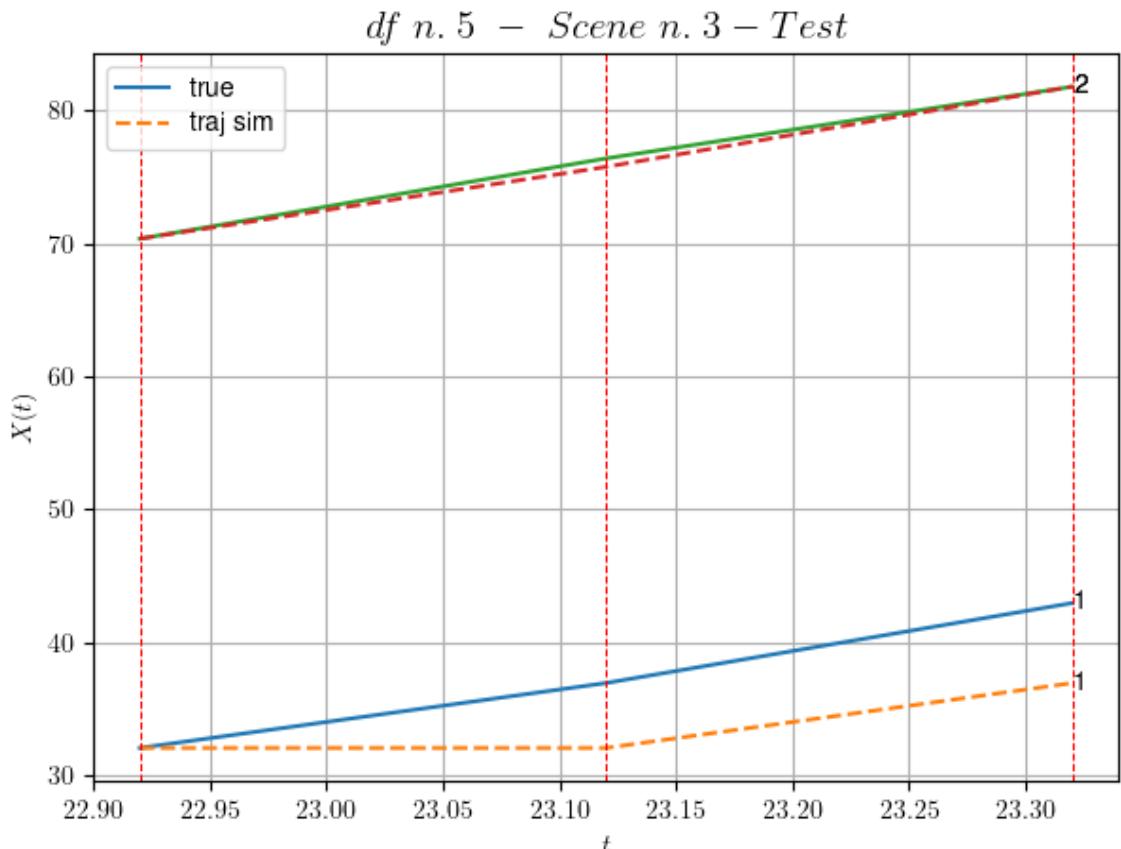
For scene 1/22:
* MSE = 13.880549719303621

DataFrame n.5. Scene n.2/22



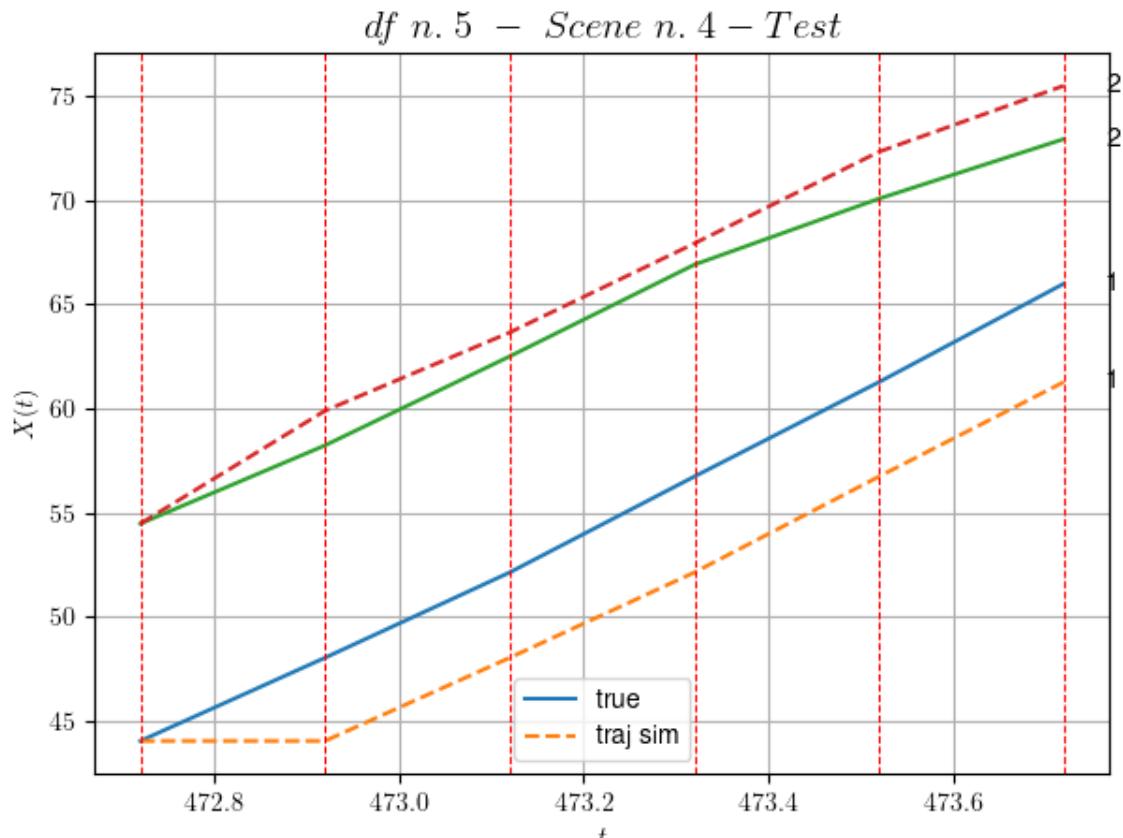
For scene 2/22:
* MSE = 10.654730129406593

DataFrame n.5. Scene n.3/22



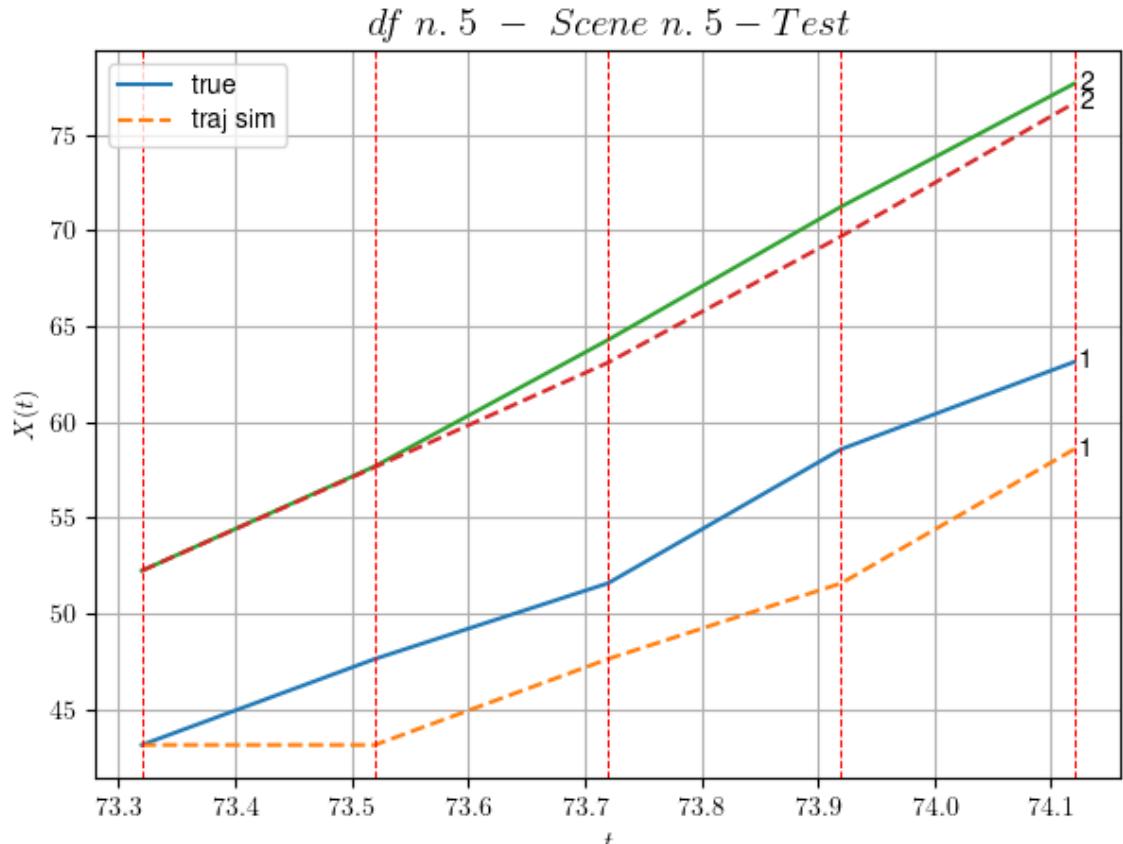
For scene 3/22:
* MSE = 10.098359503260424

DataFrame n.5. Scene n.4/22



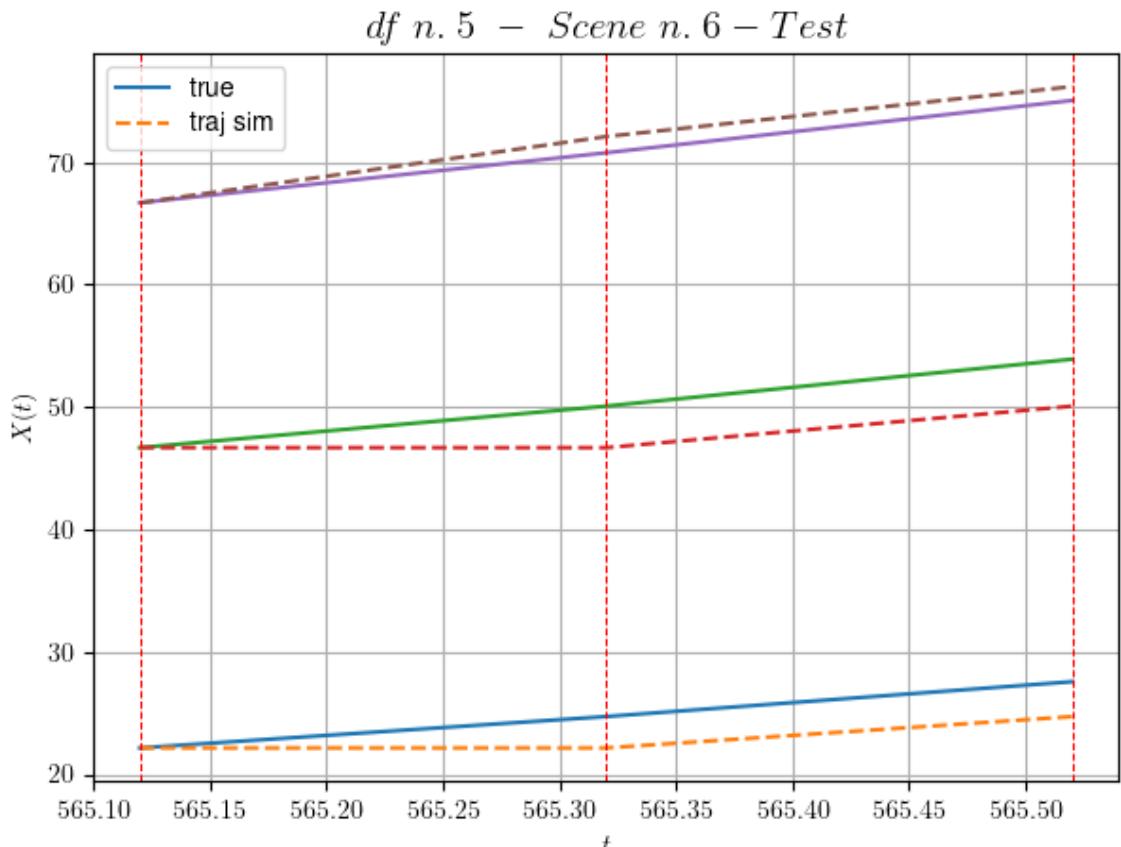
For scene 4/22:
* MSE = 9.428782213228054

DataFrame n.5. Scene n.5/22



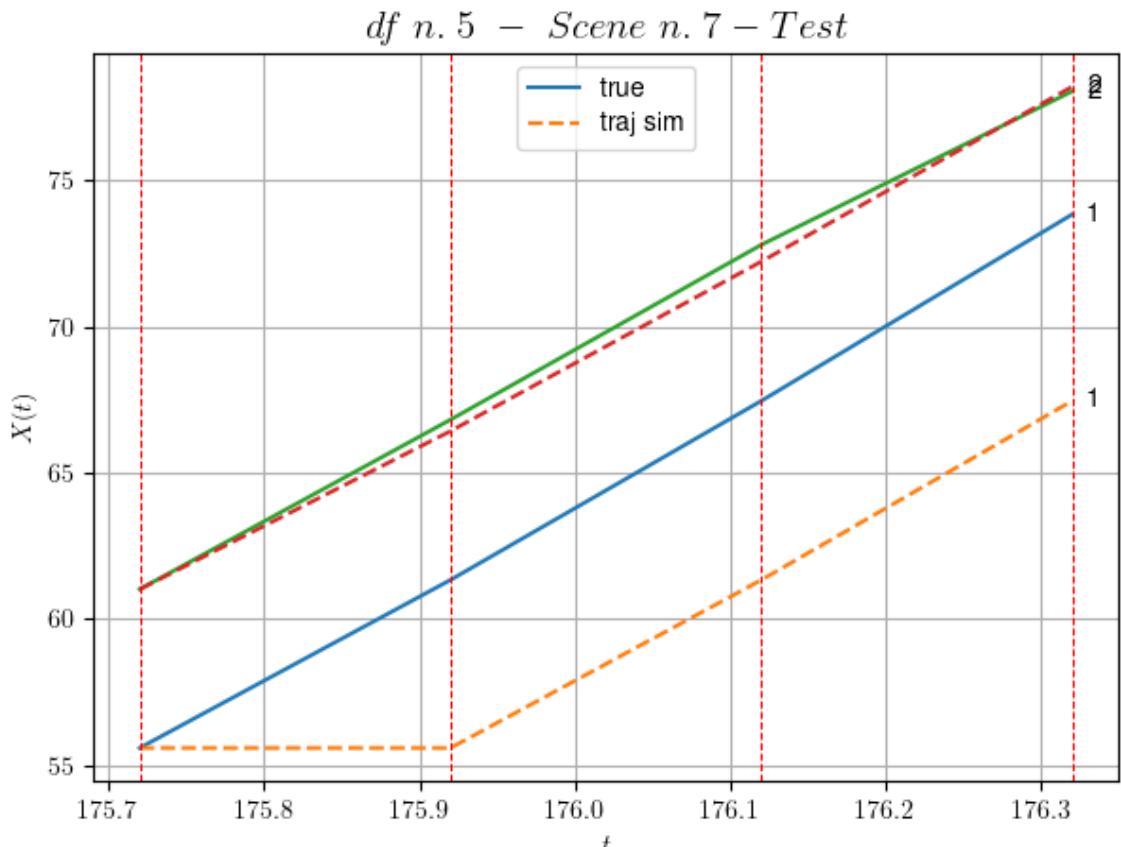
For scene 5/22:
* MSE = 11.041101514505149

DataFrame n.5. Scene n.6/22



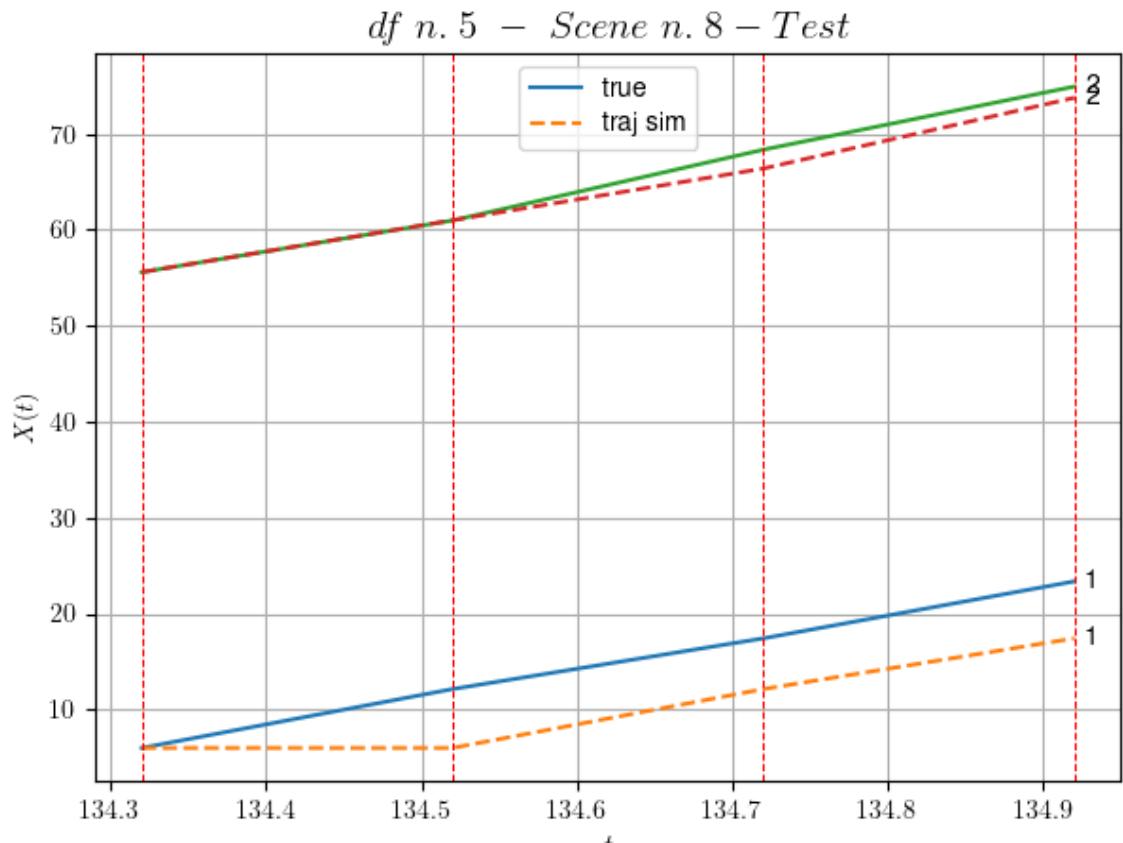
For scene 6/22:
* MSE = 4.885980877193581

DataFrame n.5. Scene n.7/22



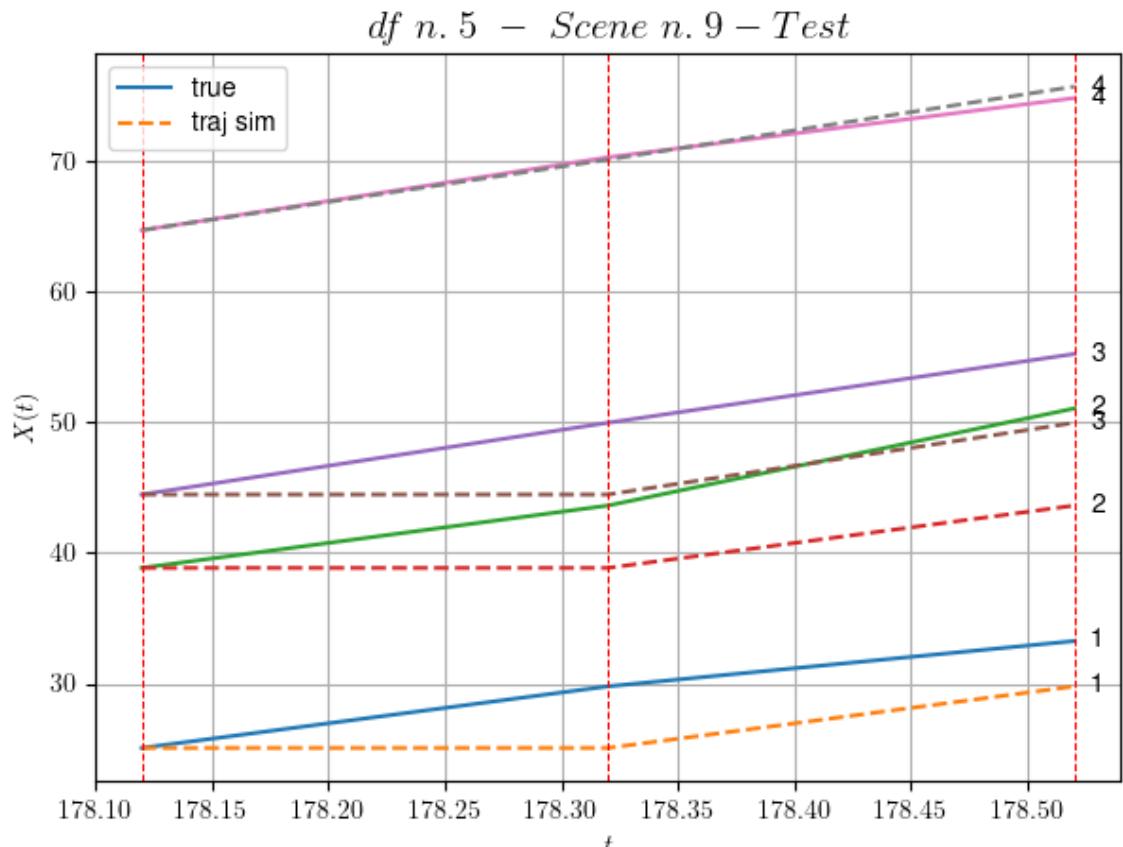
For scene 7/22:
* MSE = 13.98063263031595

DataFrame n.5. Scene n.8/22



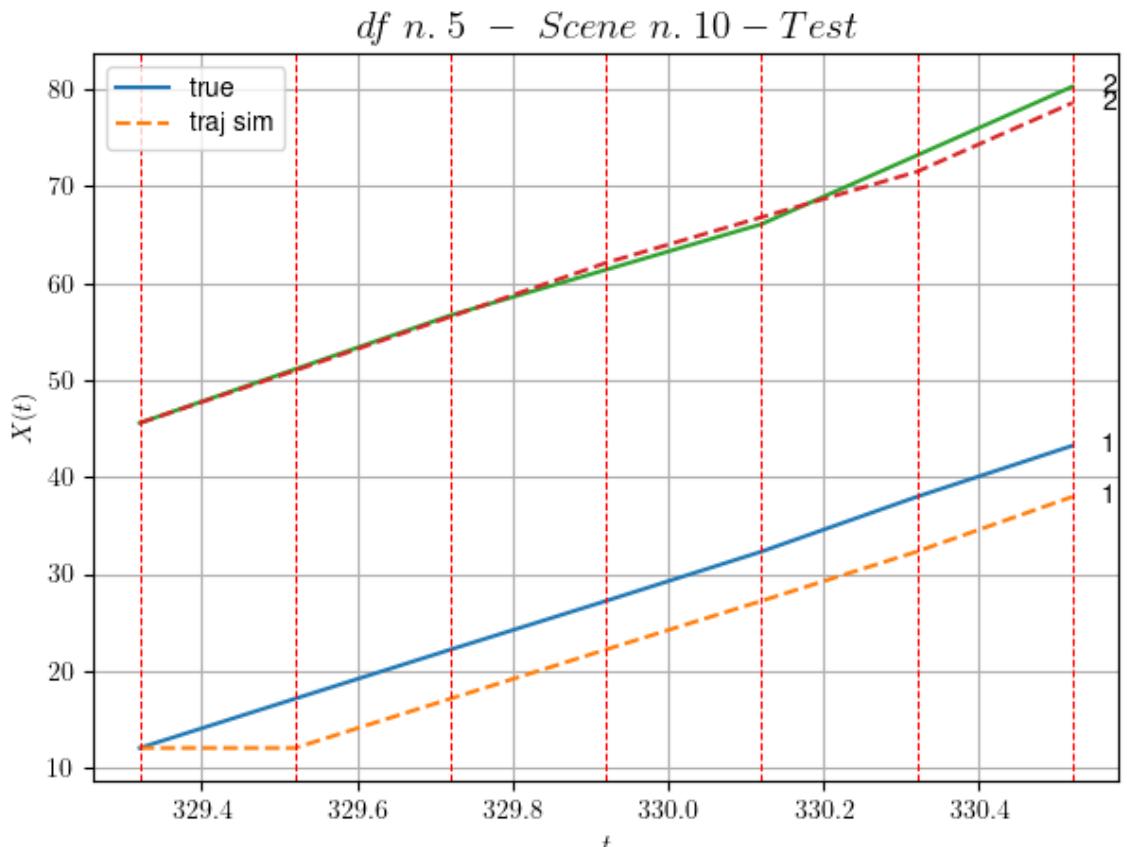
For scene 8/22:
* MSE = 13.26145989220069

DataFrame n.5. Scene n.9/22



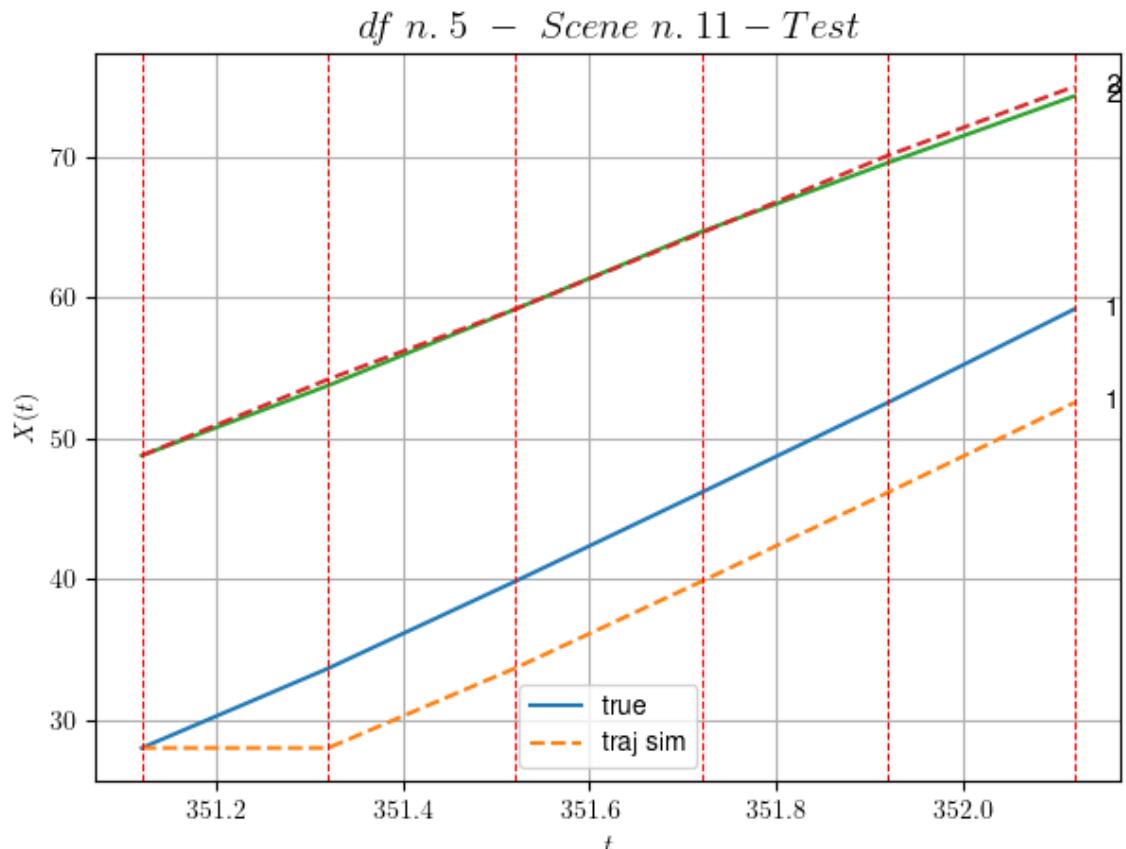
For scene 9/22:
* MSE = 14.262469141877606

DataFrame n.5. Scene n.10/22



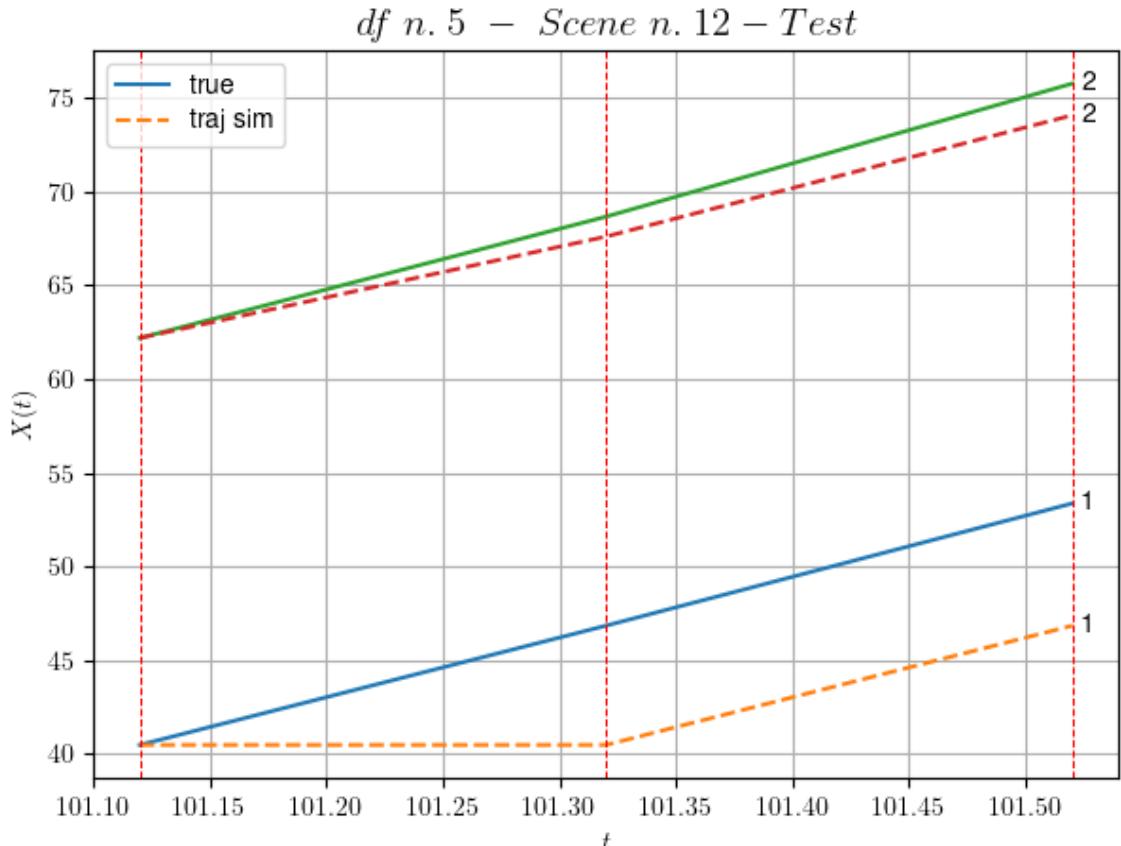
For scene 10/22:
* MSE = 12.071448365895096

DataFrame n.5. Scene n.11/22



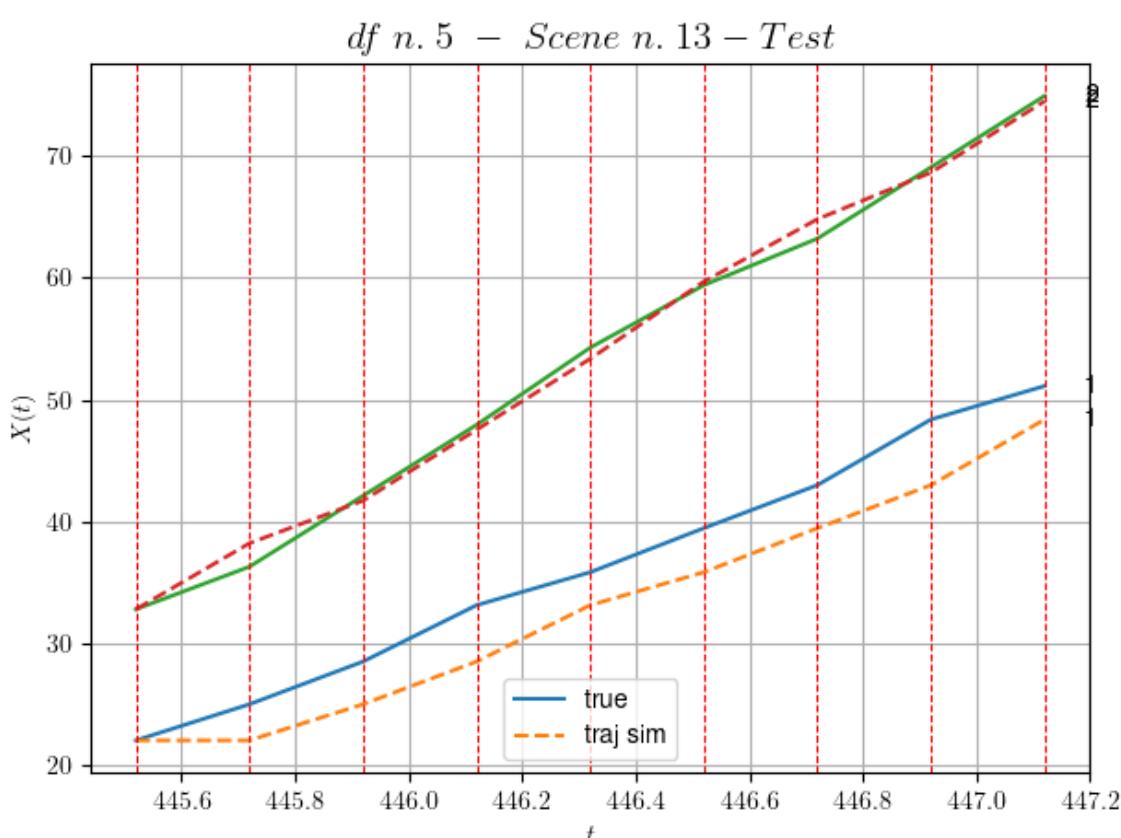
For scene 11/22:
* MSE = 16.28071631978153

DataFrame n.5. Scene n.12/22



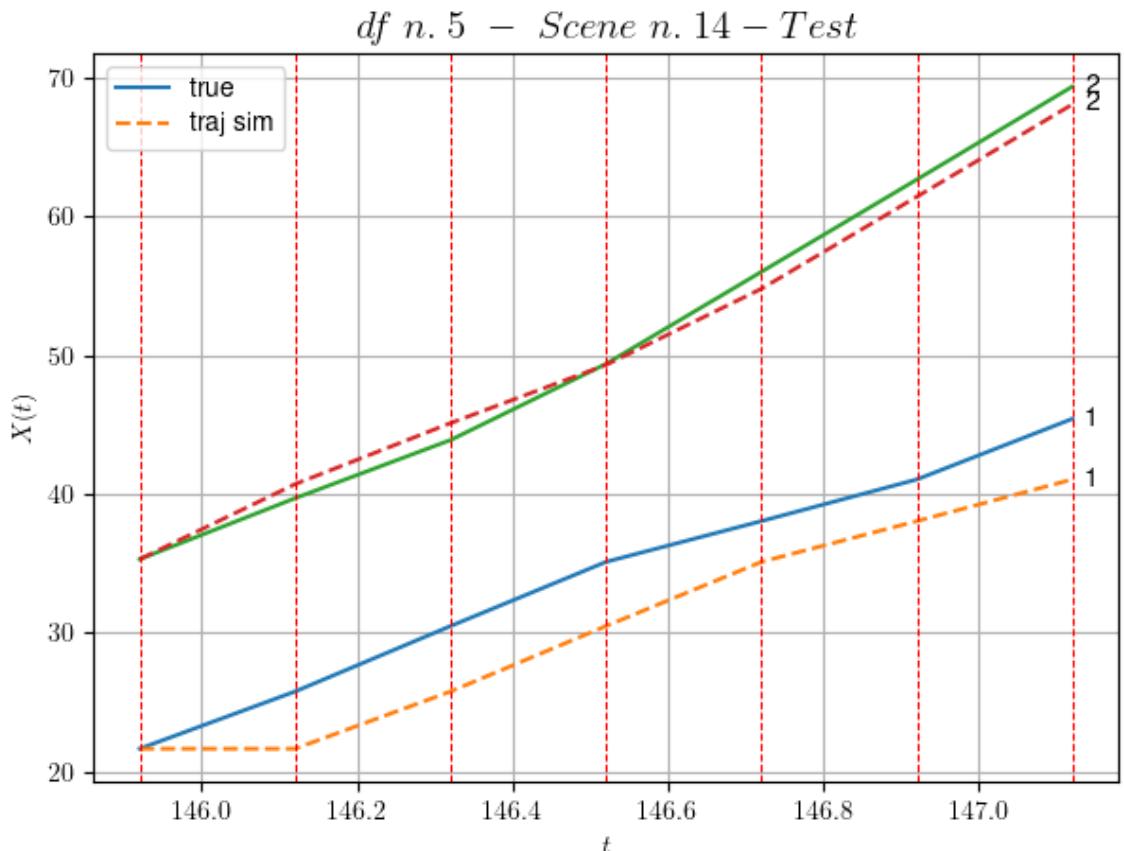
For scene 12/22:
* MSE = 14.499309999788903

DataFrame n.5. Scene n.13/22



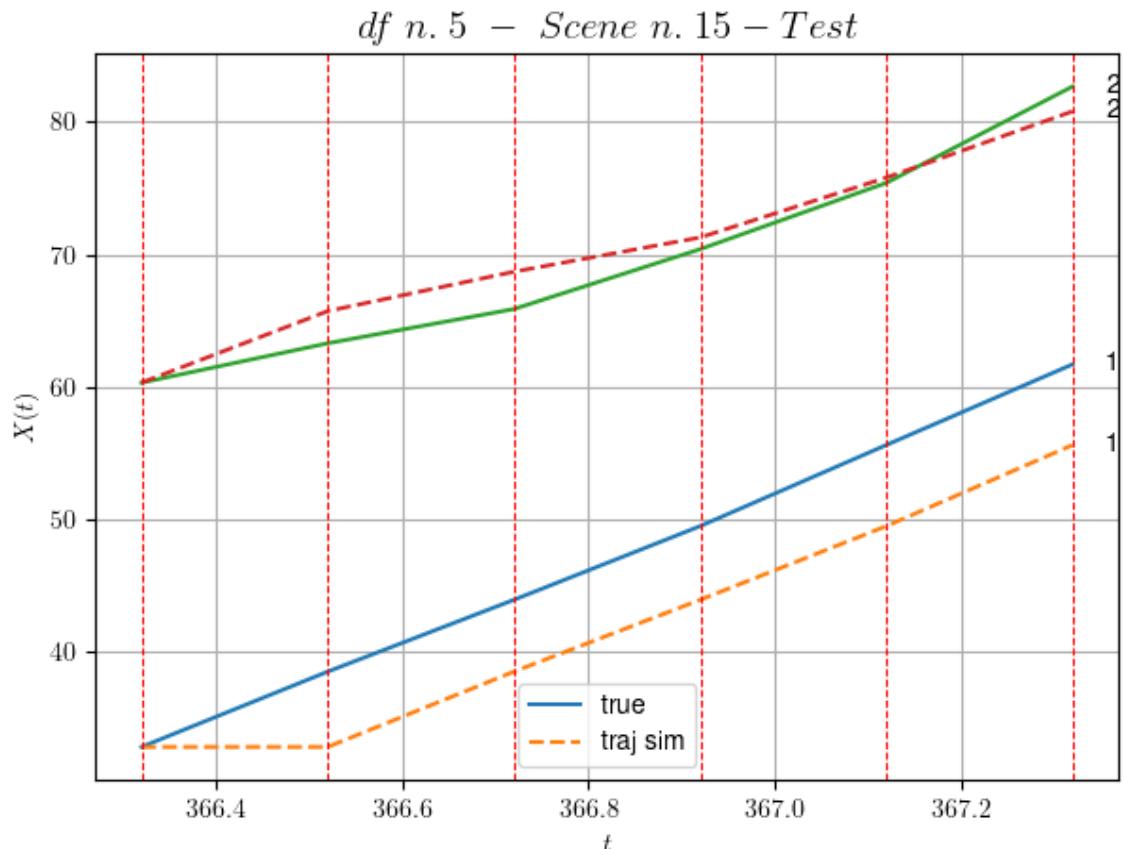
For scene 13/22:
* MSE = 6.635306301727254

DataFrame n.5. Scene n.14/22



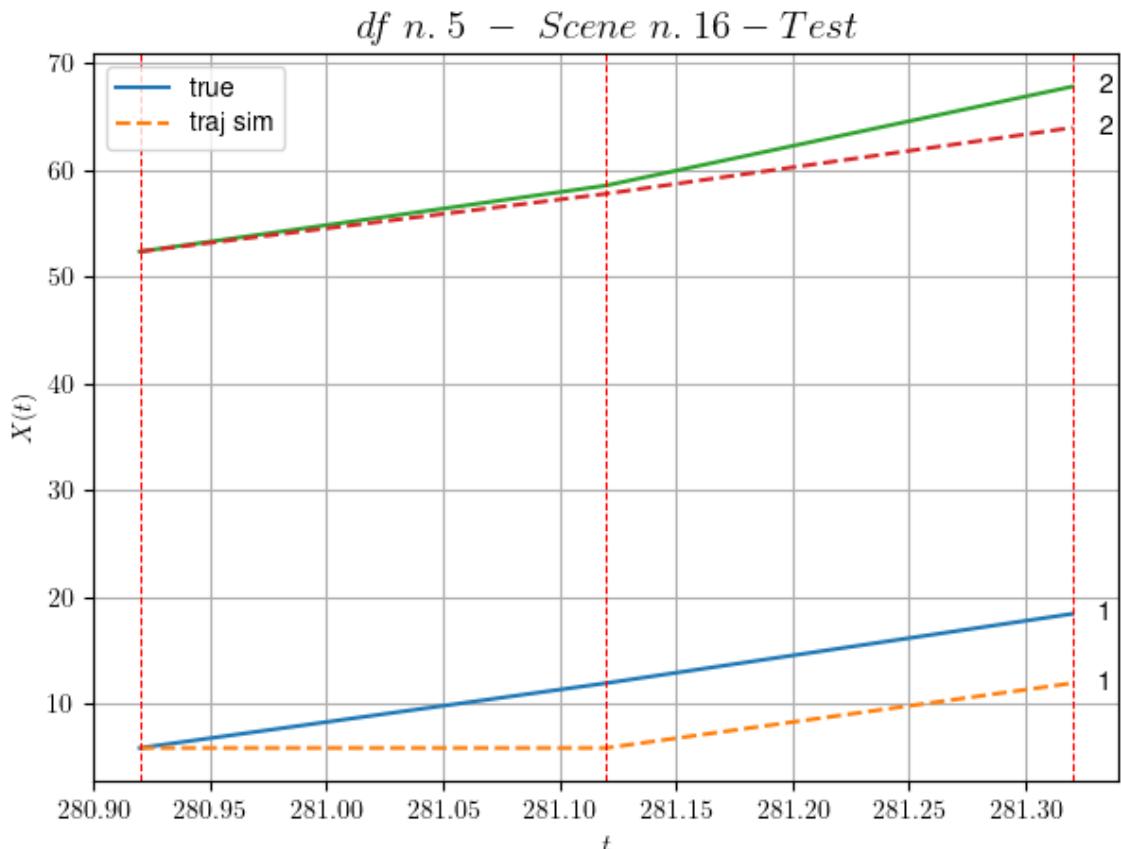
For scene 14/22:
* MSE = 7.464866446918628

DataFrame n.5. Scene n.15/22



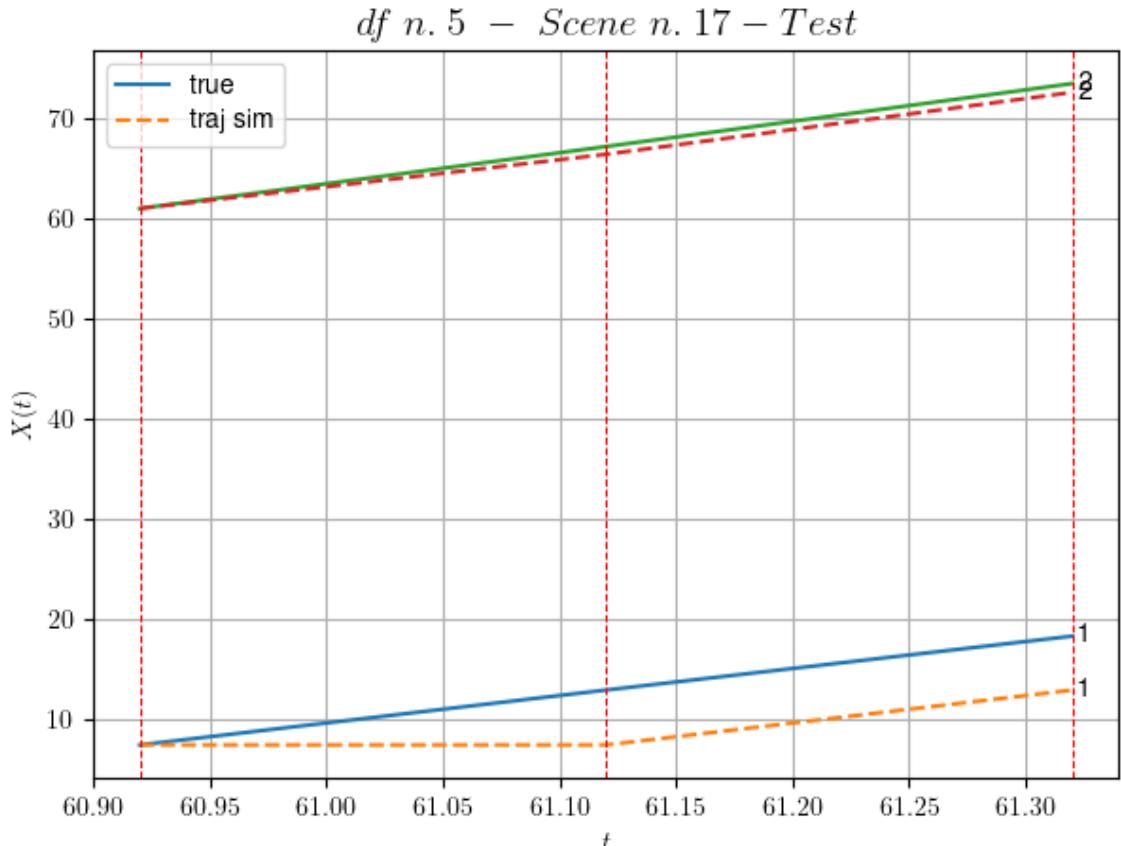
For scene 15/22:
* MSE = 15.511832014574976

DataFrame n.5. Scene n.16/22



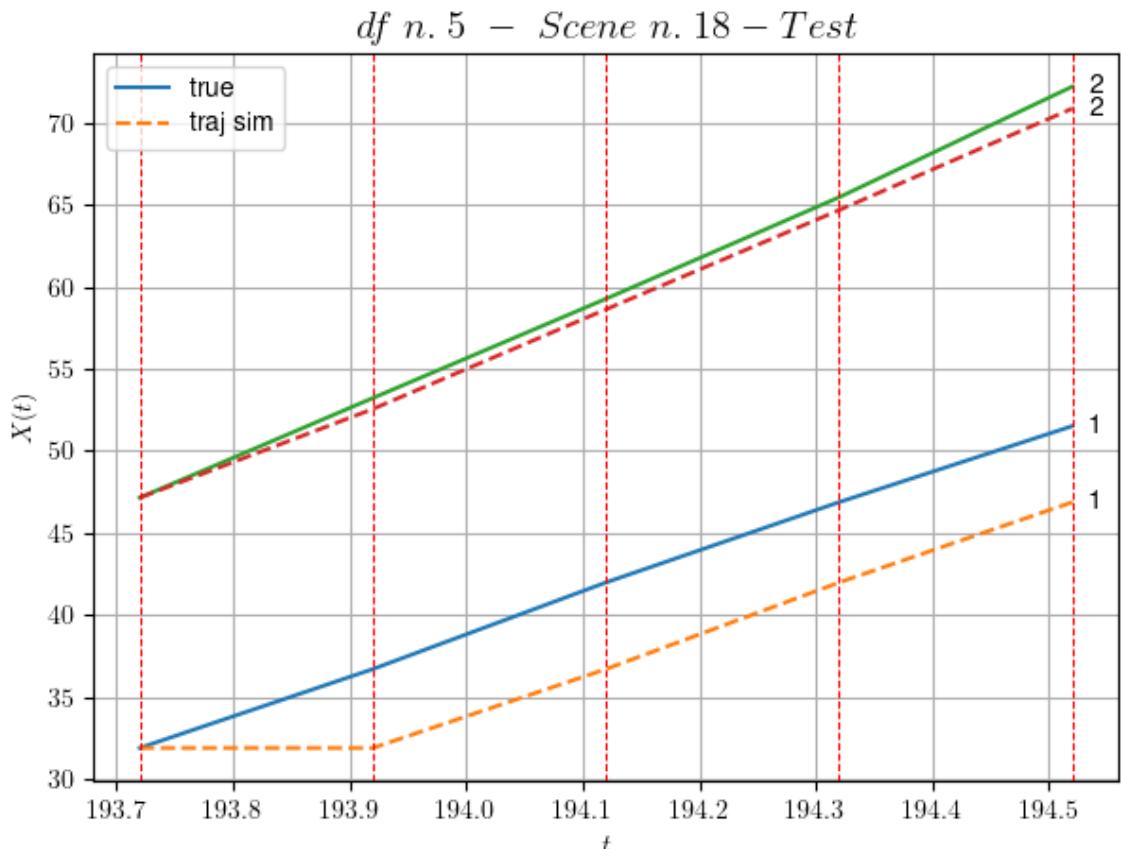
For scene 16/22:
* MSE = 15.726962222884021

DataFrame n.5. Scene n.17/22



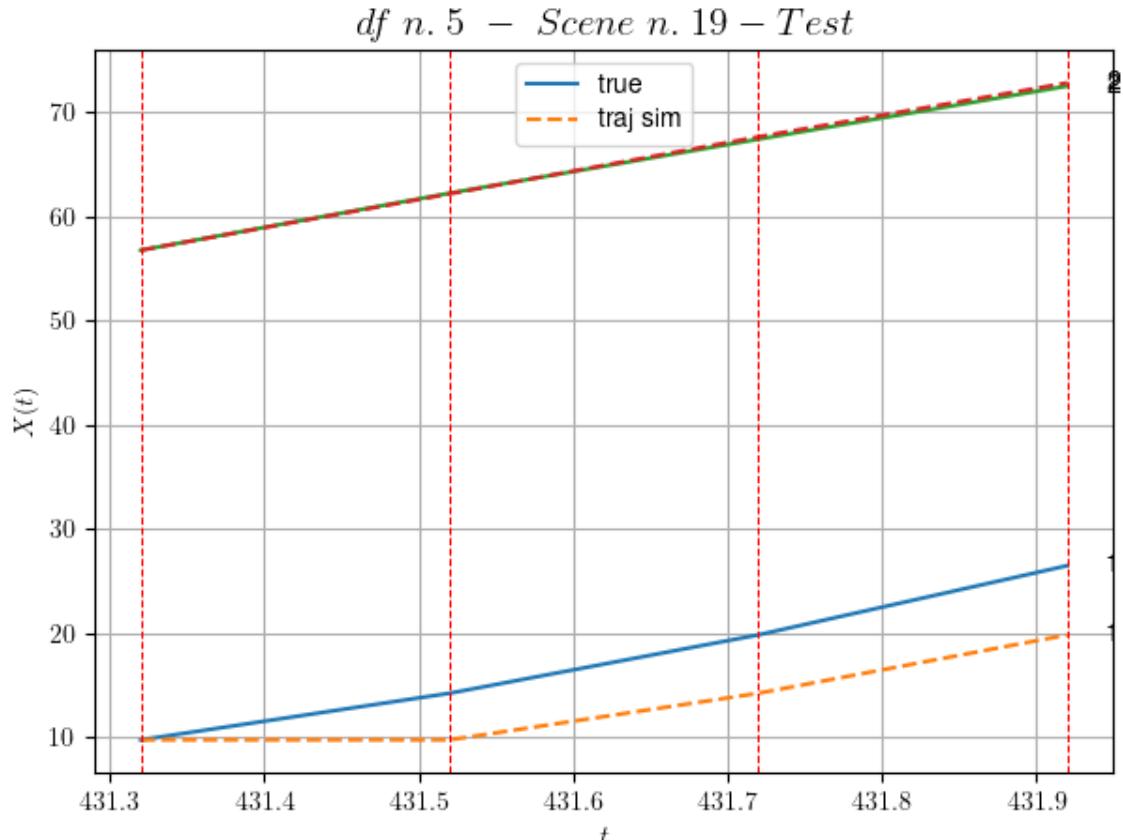
For scene 17/22:
* MSE = 10.068477523674481

DataFrame n.5. Scene n.18/22



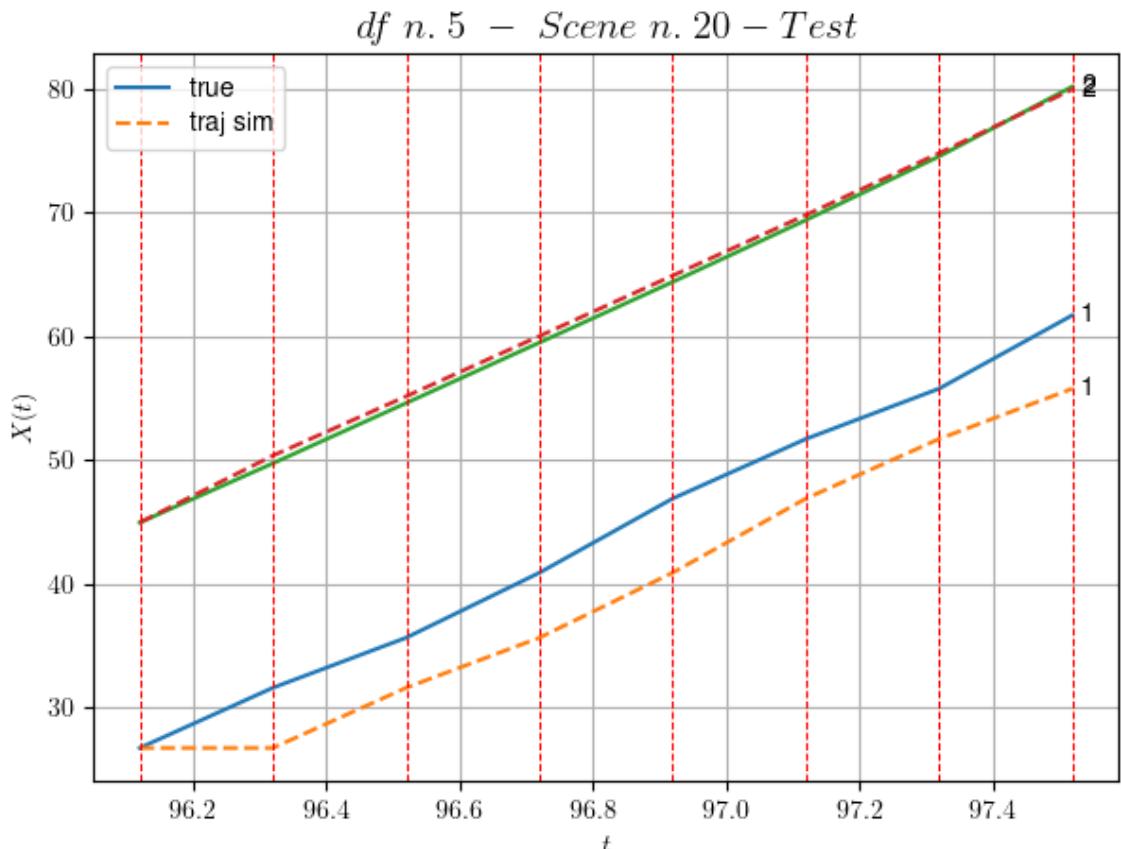
For scene 18/22:
* MSE = 9.986799692540721

DataFrame n.5. Scene n.19/22



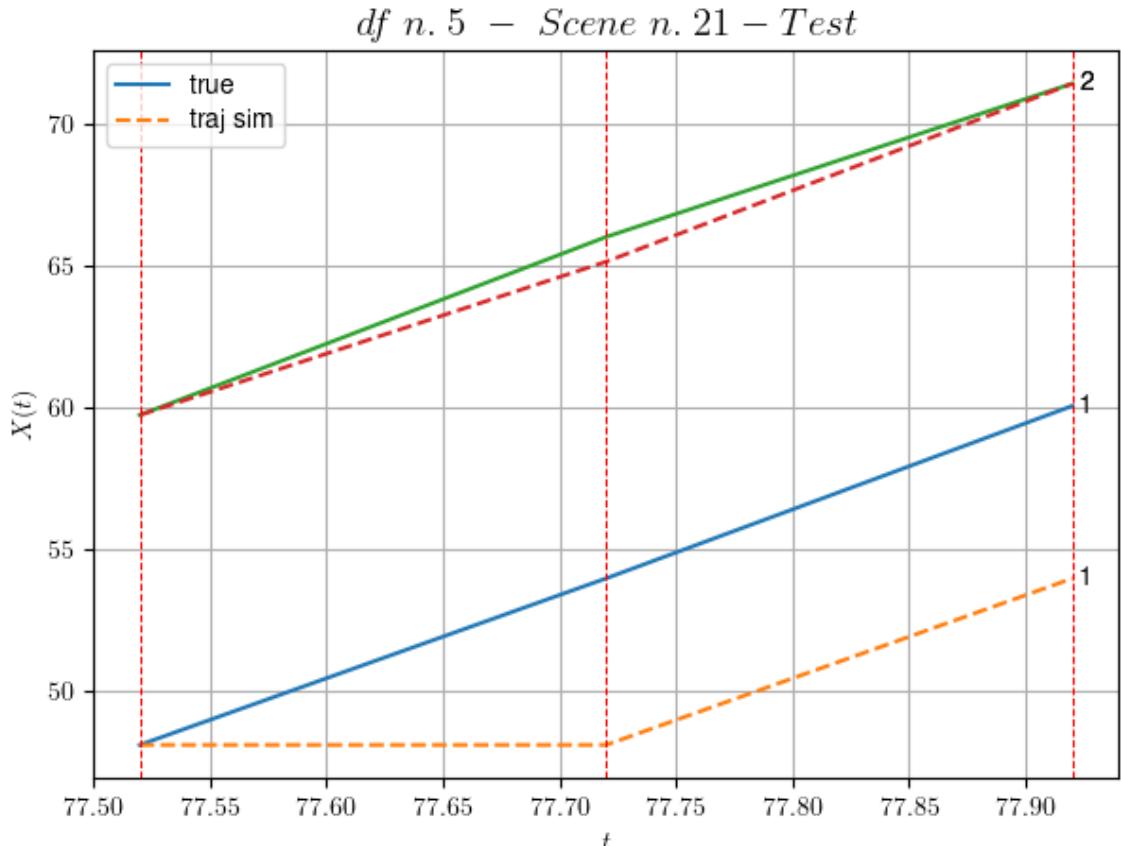
For scene 19/22:
* MSE = 11.975940904298328

DataFrame n.5. Scene n.20/22



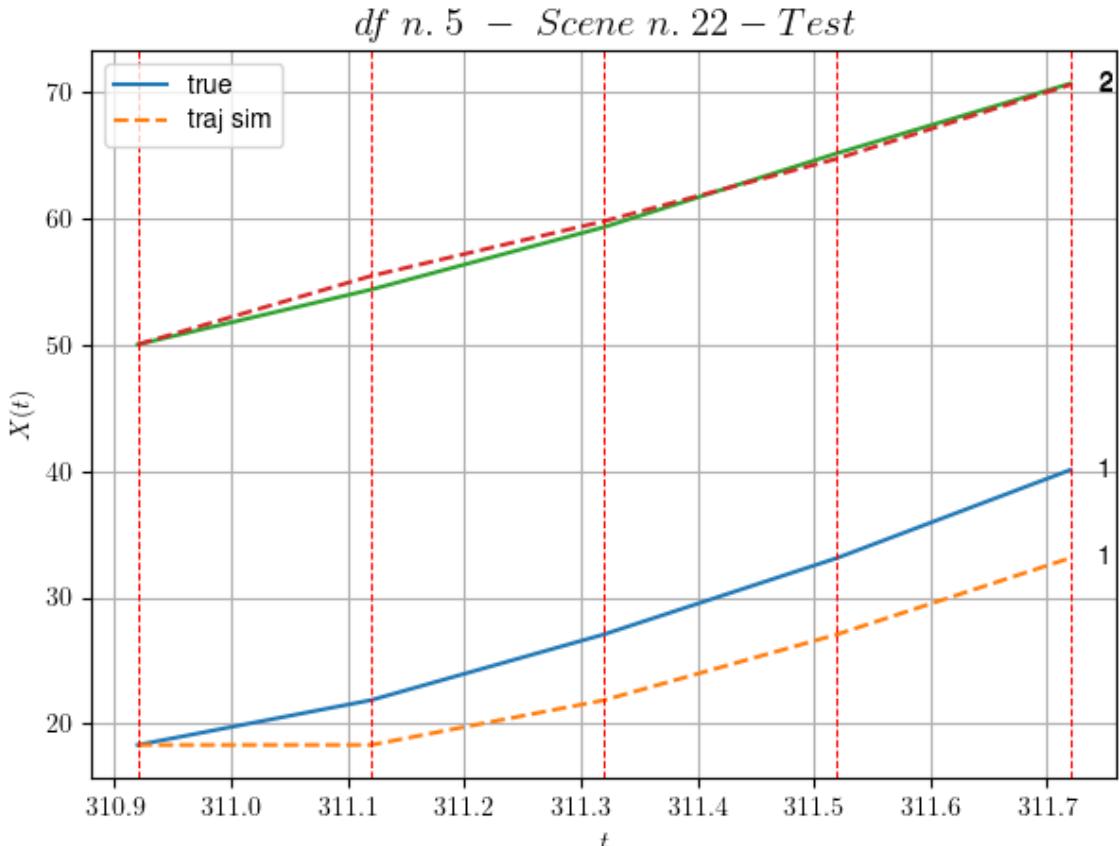
For scene 20/22:
* MSE = 11.243193843633504

DataFrame n.5. Scene n.21/22



For scene 21/22:
* MSE = 12.06464017936158

DataFrame n.5. Scene n.22/22



MSE test: 11.710749371781736

Summing up:
* MSE train: 30.27813677882043
* MSE test: 11.710749371781736

Analyzing 6/10 dfs.

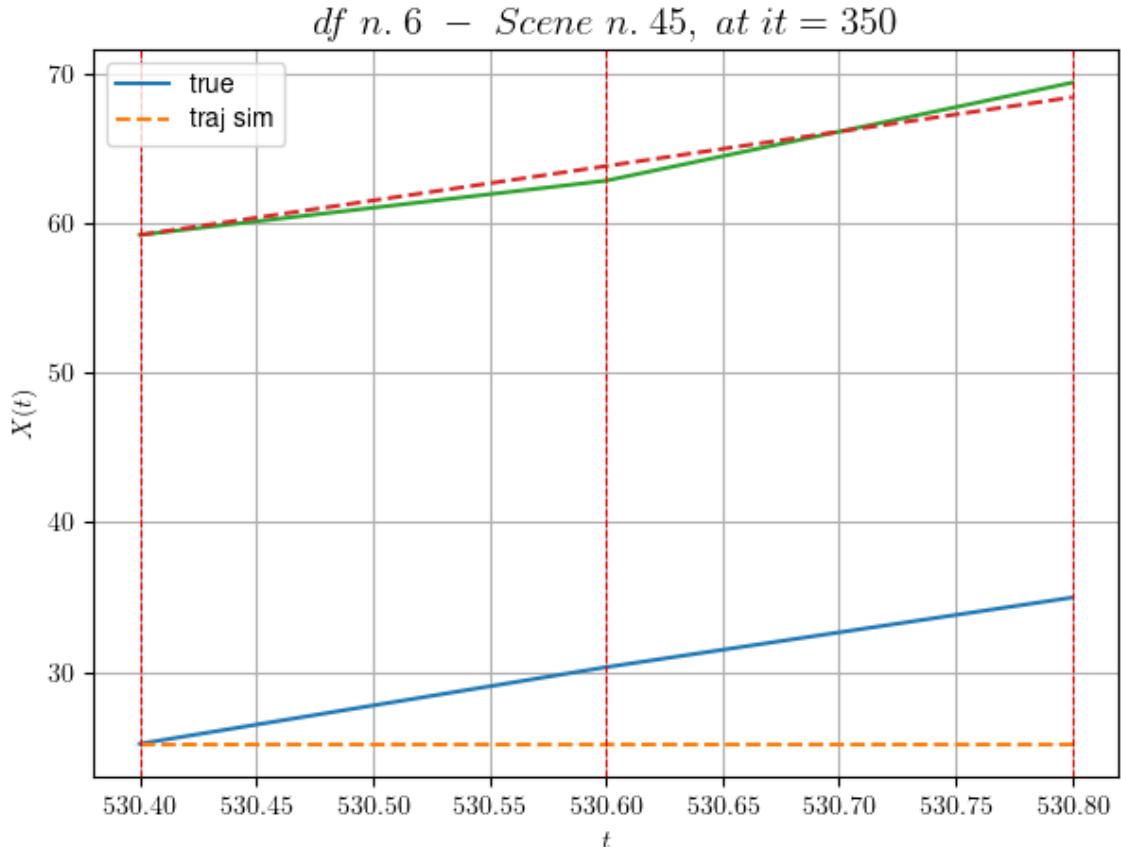
In DataFrame n.6 we have 52 scenes.

To train the model we use 34 scenes, the remaining 18 to test the model.

Training step. (34 scenes)

DataFrame n.6. Scene n.1/34

We have 2 time intervals inside [530.40, 530.80]



For scene 1/34:

* After LR finder: LR_NN=5e-05 with mse=1.5015205542163905

at it=24

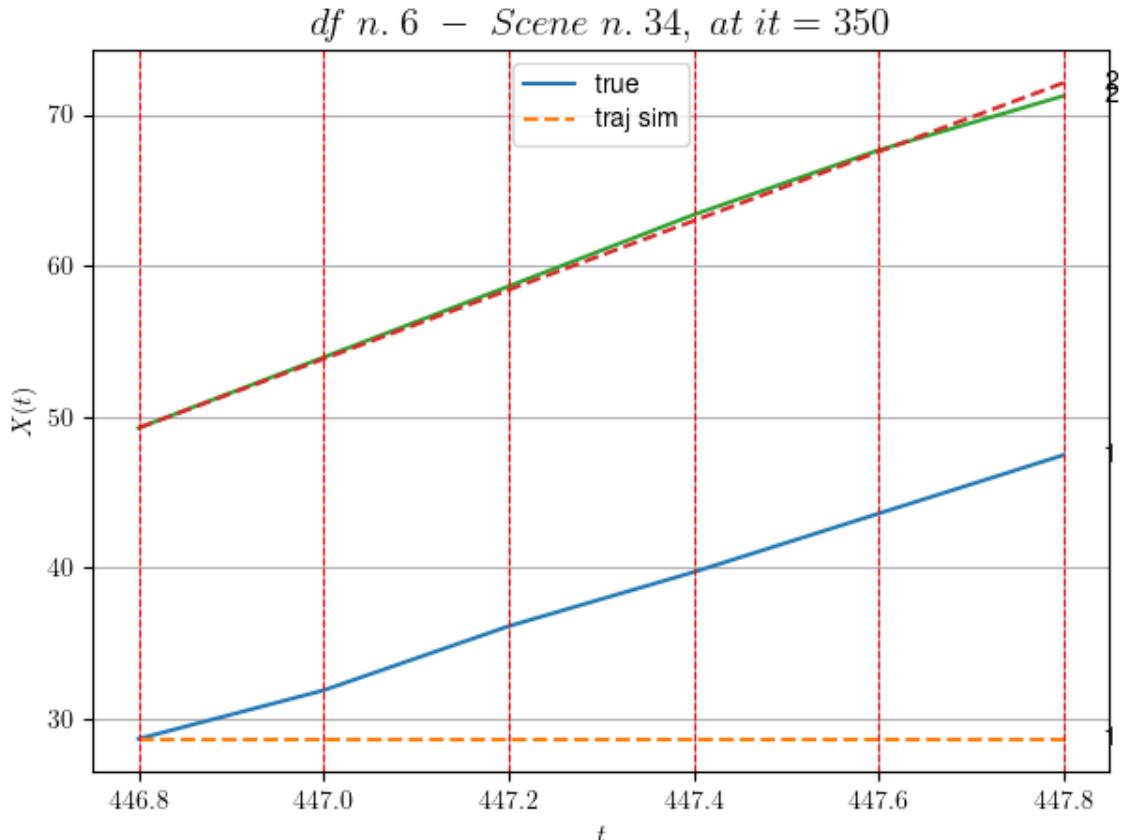
* v0 = 22.991928149215976

* MSE = 20.5511194235897

* iterations = 350

DataFrame n.6. Scene n.2/34

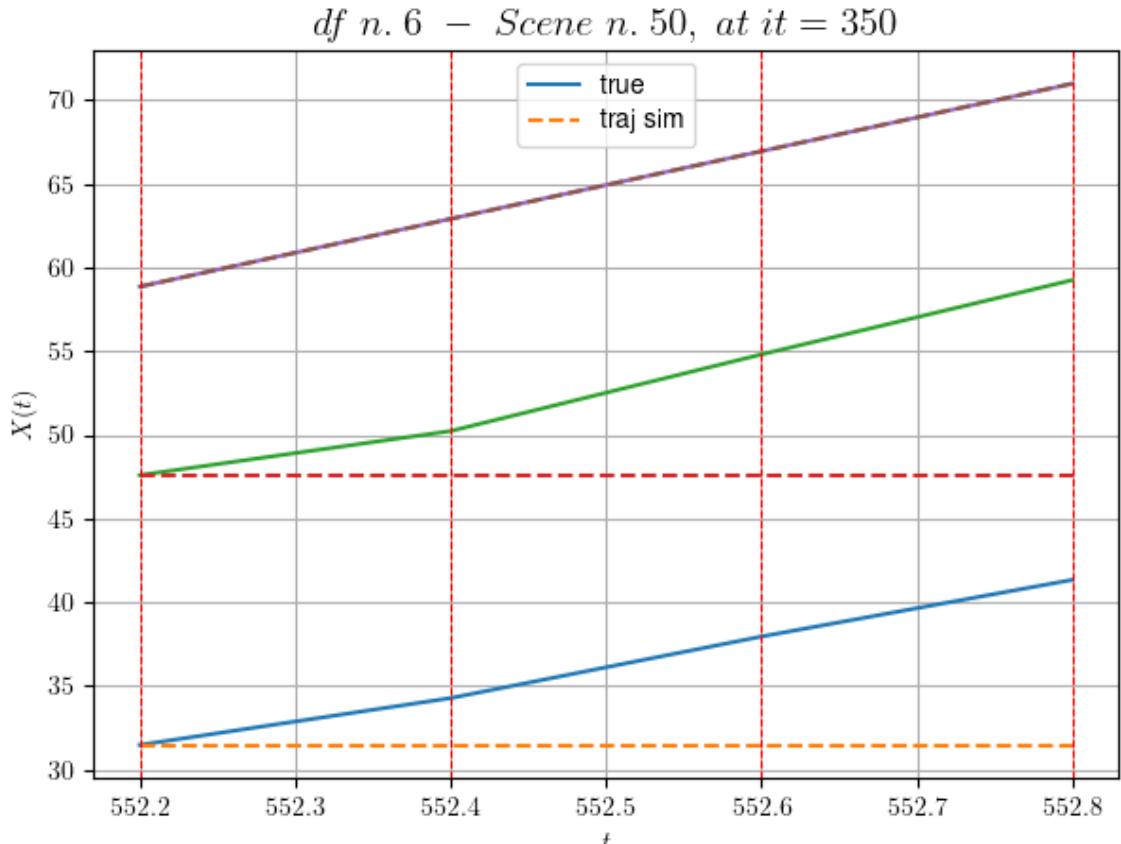
We have 5 time intervals inside [446.80,447.80]



For scene 2/34:
* After LR finder: $LR_{NN}=0.0001$ with $mse=9.995574138388346$
at it=24
* $v_0 = 22.841483045538396$
* MSE = 63.61223573502749
* iterations = 350

DataFrame n.6. Scene n.3/34

We have 3 time intervals inside [552.20, 552.80]

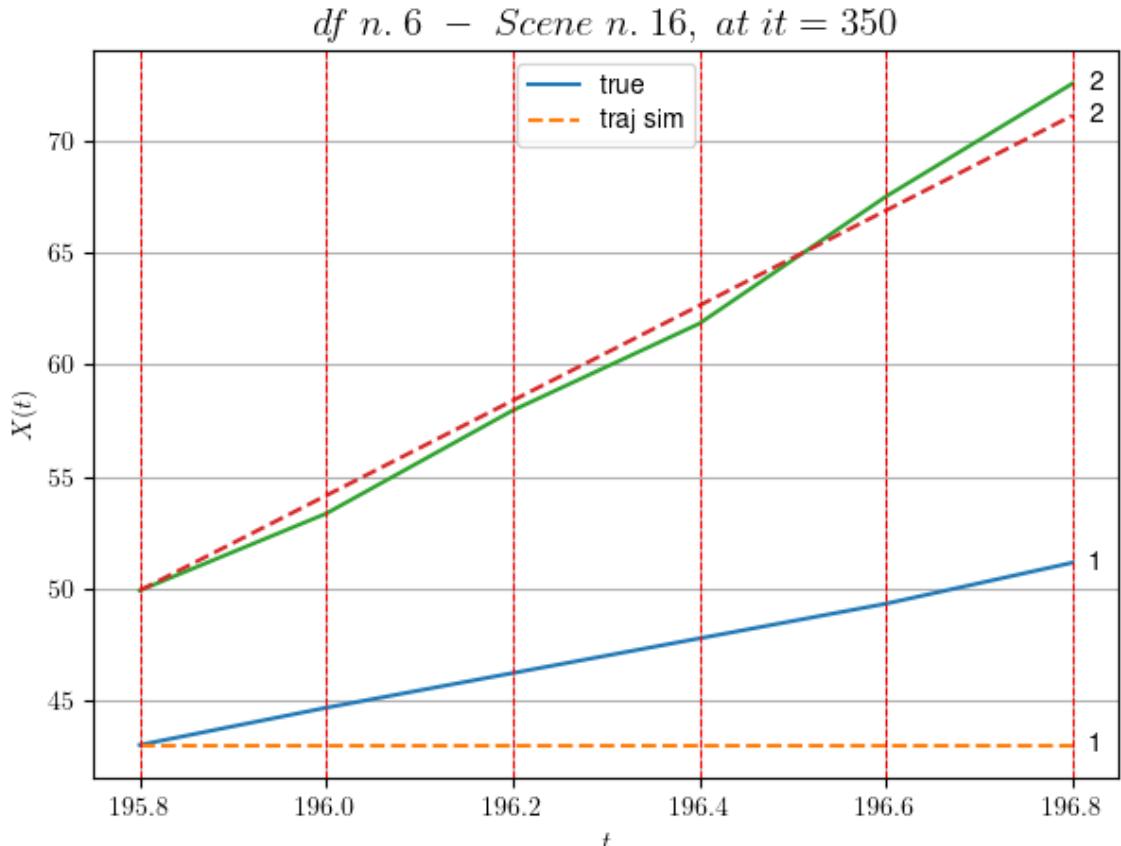


For scene 3/34:

* After LR finder: LR_NN=5e-05 with mse=5.8468808028116515
at it=24
* v0 = 20.233275612772847
* MSE = 28.521868955228555
* iterations = 350

DataFrame n.6. Scene n.4/34

We have 5 time intervals inside [195.80,196.80]



For scene 4/34:

* After LR finder: LR_NN=0.001 with mse=13.253953028348704

at it=24

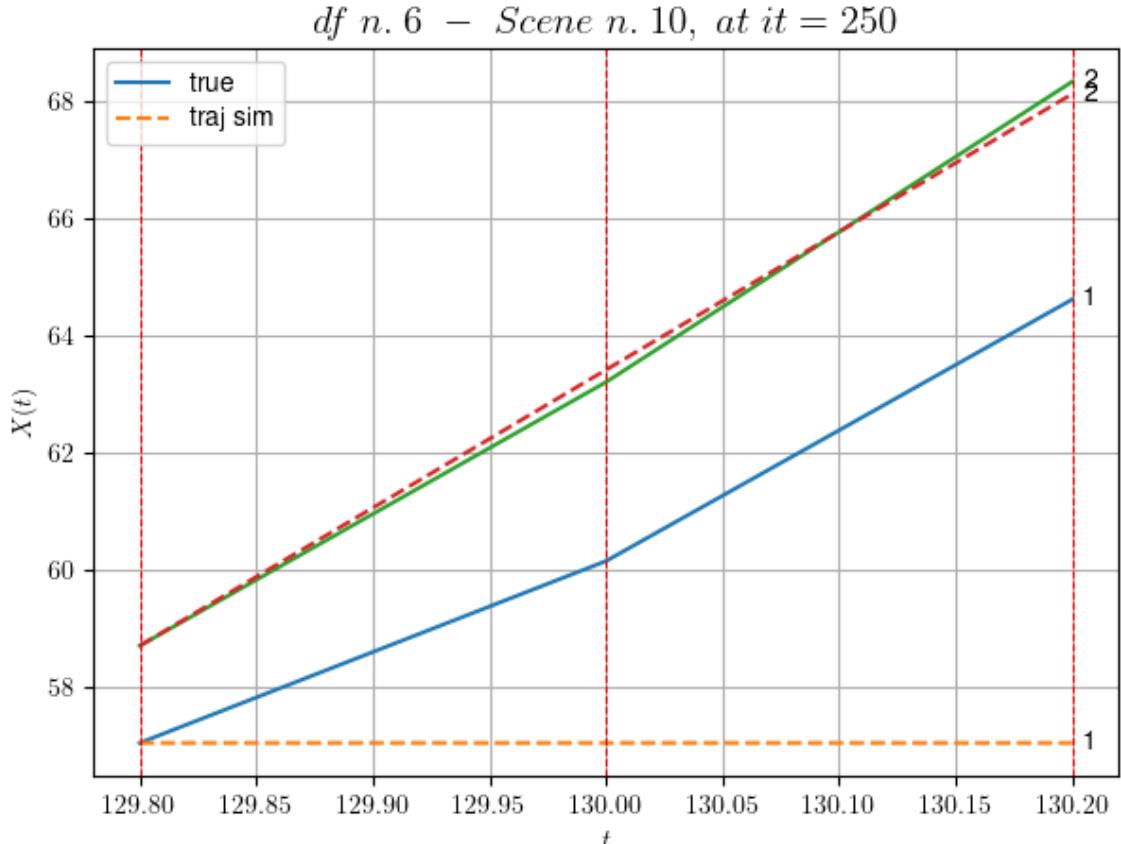
* v0 = 21.23734758802306

* MSE = 12.126771053832547

* iterations = 350

DataFrame n.6. Scene n.5/34

We have 2 time intervals inside [129.80,130.20]

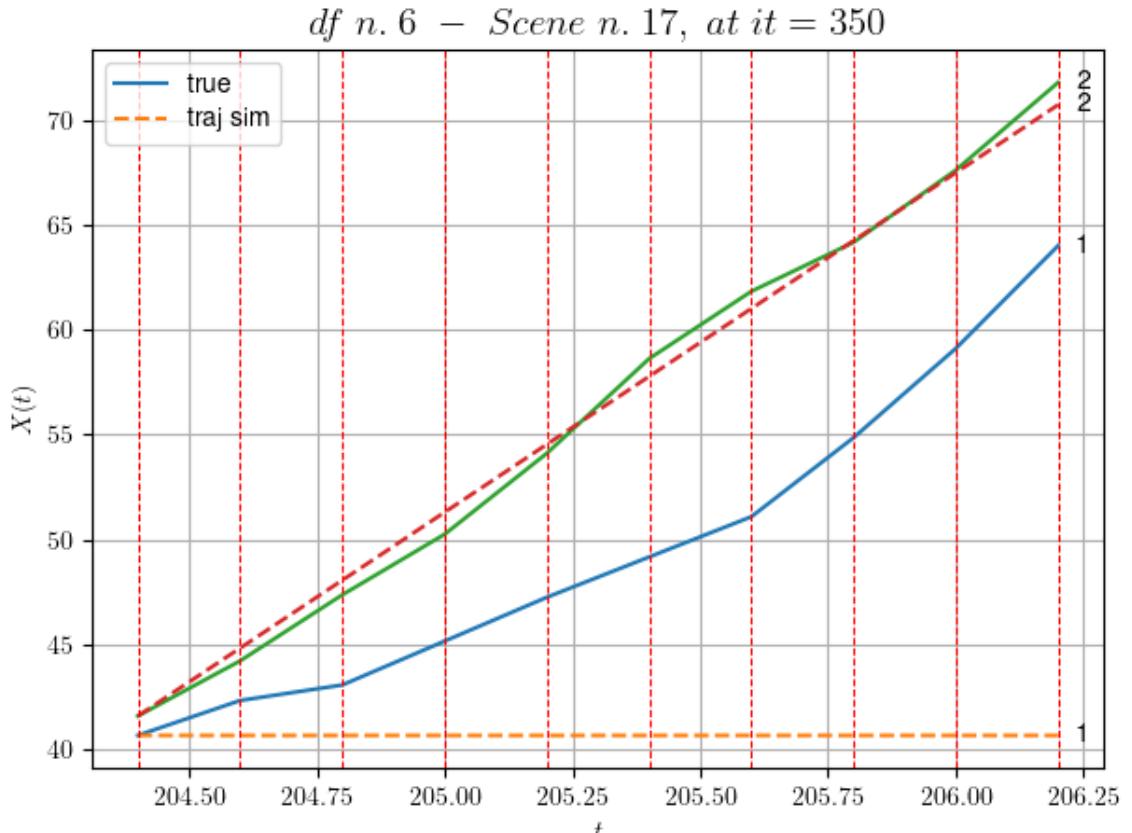


For scene 5/34:

* After LR finder: LR_NN=0.01 with mse=1.296865824543648 at
it=24
* v0 = 23.601851095939058
* MSE = 11.219391455632294
* iterations = 250

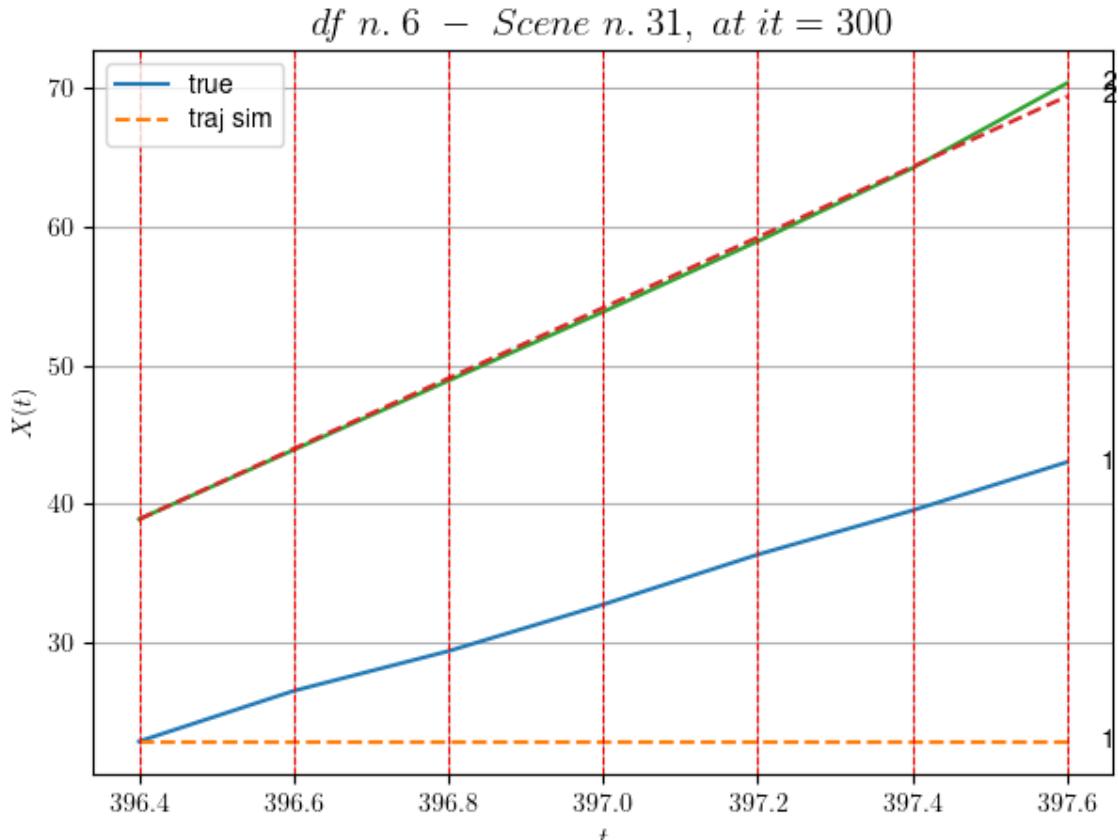
DataFrame n.6. Scene n.6/34

We have 9 time intervals inside [204.40,206.20]



DataFrame n.6. Scene n.7/34

We have 6 time intervals inside [396.40,397.60]



For scene 7/34:

* After LR finder: $LR_{NN}=0.001$ with $mse=5.337400769478515$ at it=24

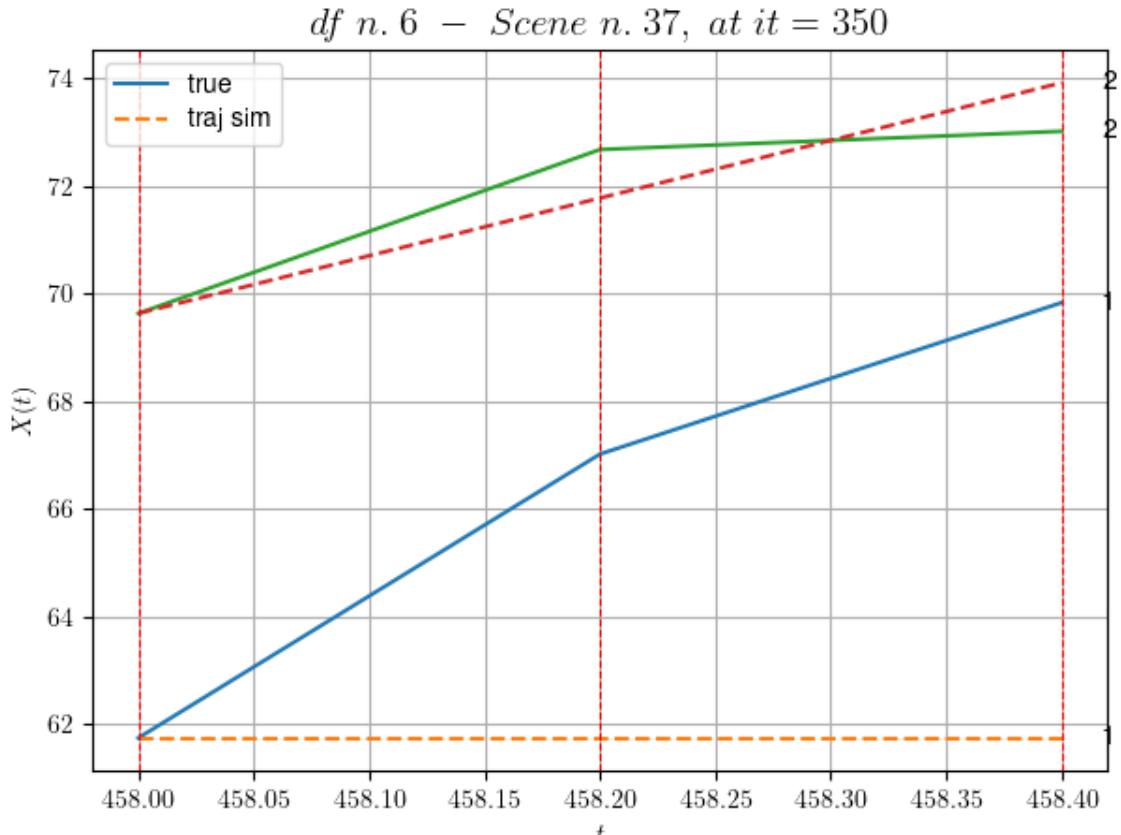
* $v_0 = 25.42985106742265$

* MSE = 72.81939406056031

* iterations = 300

DataFrame n.6. Scene n.8/34

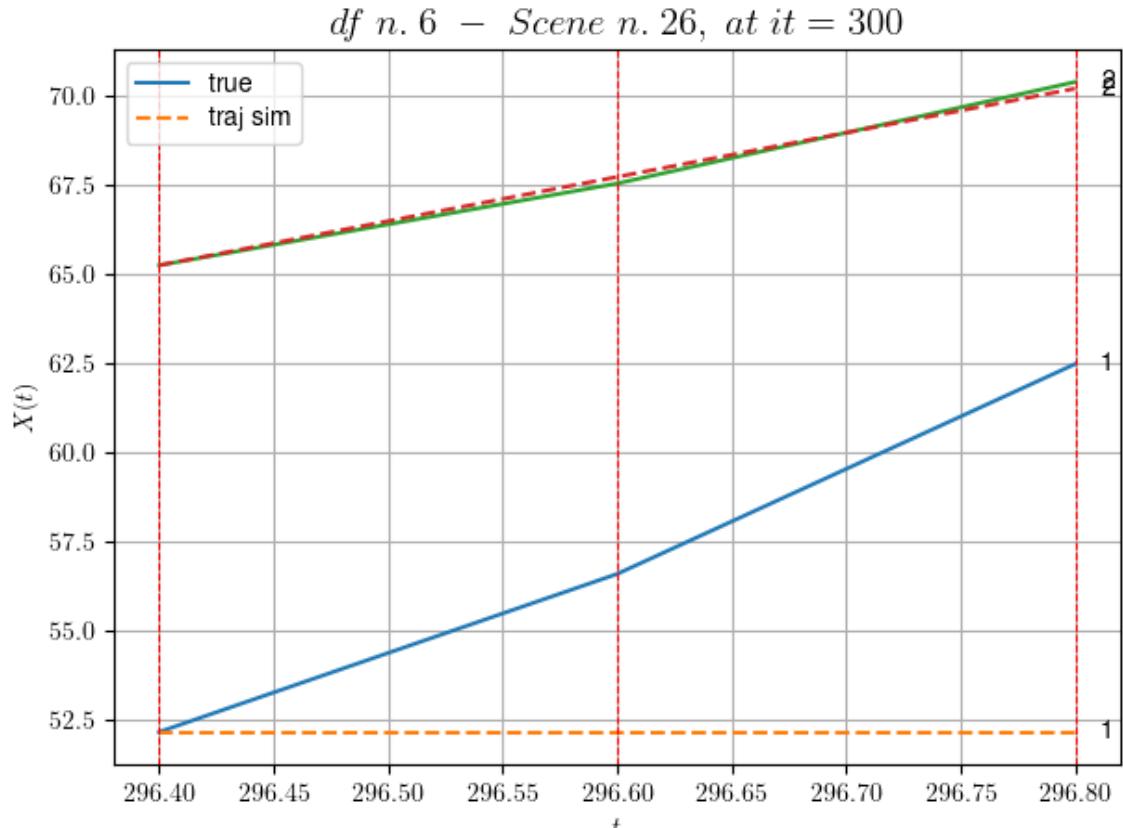
We have 2 time intervals inside [458.00, 458.40]



For scene 8/34:
* After LR finder: LR_NN=0.0005 with mse=13.874614434563401
at it=24
* $v_0 = 10.716650447110068$
* MSE = 15.818793095247184
* iterations = 350

DataFrame n.6. Scene n.9/34

We have 2 time intervals inside [296.40, 296.80]

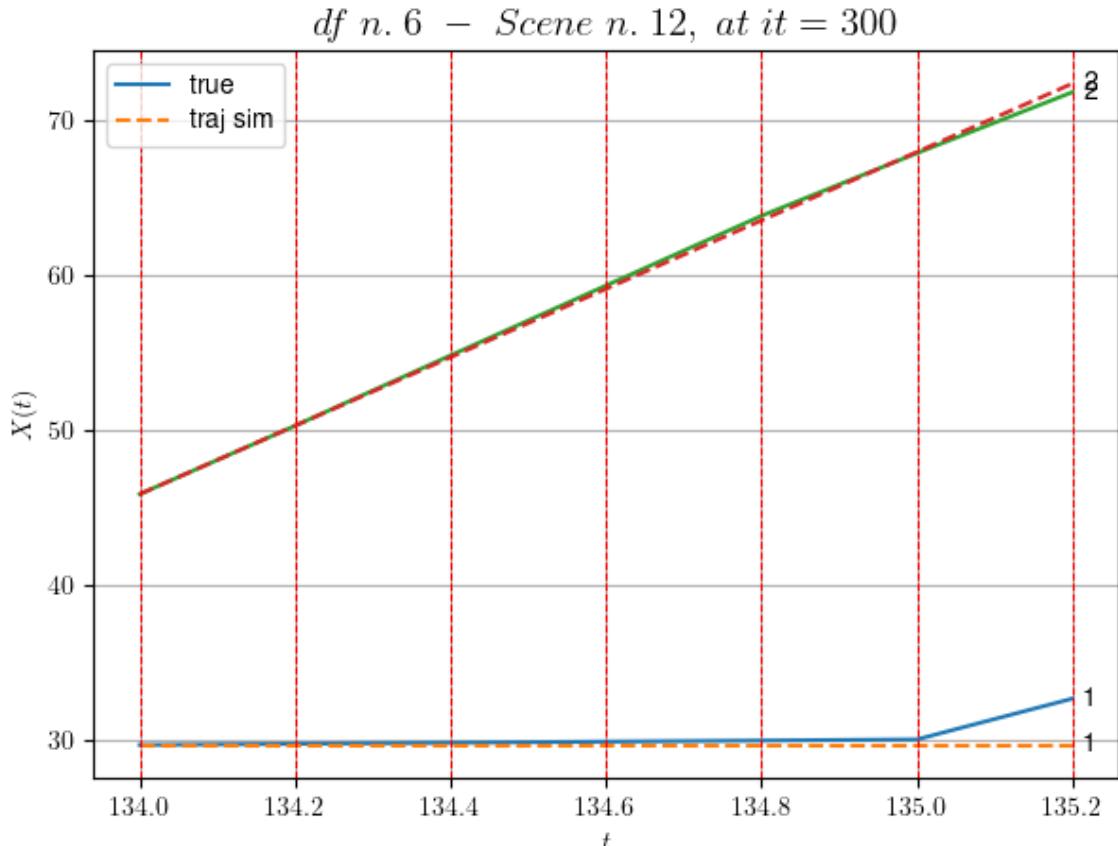


For scene 9/34:

* After LR finder: LR_NN=0.0005 with mse=10.5093679634443 at it=24
* v0 = 12.39941633333855
* MSE = 21.060653618731806
* iterations = 300

DataFrame n.6. Scene n.10/34

We have 6 time intervals inside [134.00,135.20]

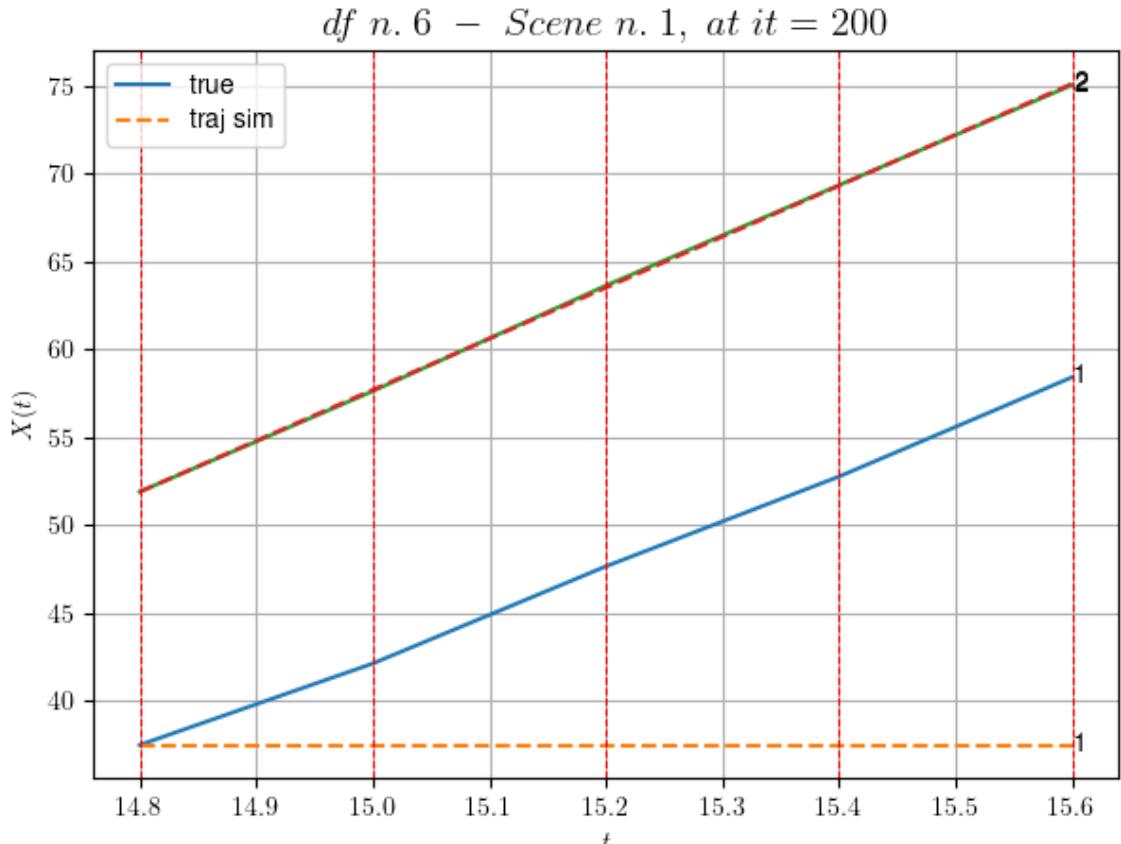


For scene 10/34:

* After LR finder: LR_NN=0.01 with mse=17.44142674247583 at
it=24
* $v_0 = 22.063234069263405$
* MSE = 0.6914225396416214
* iterations = 300

DataFrame n.6. Scene n.11/34

We have 4 time intervals inside [14.80,15.60]

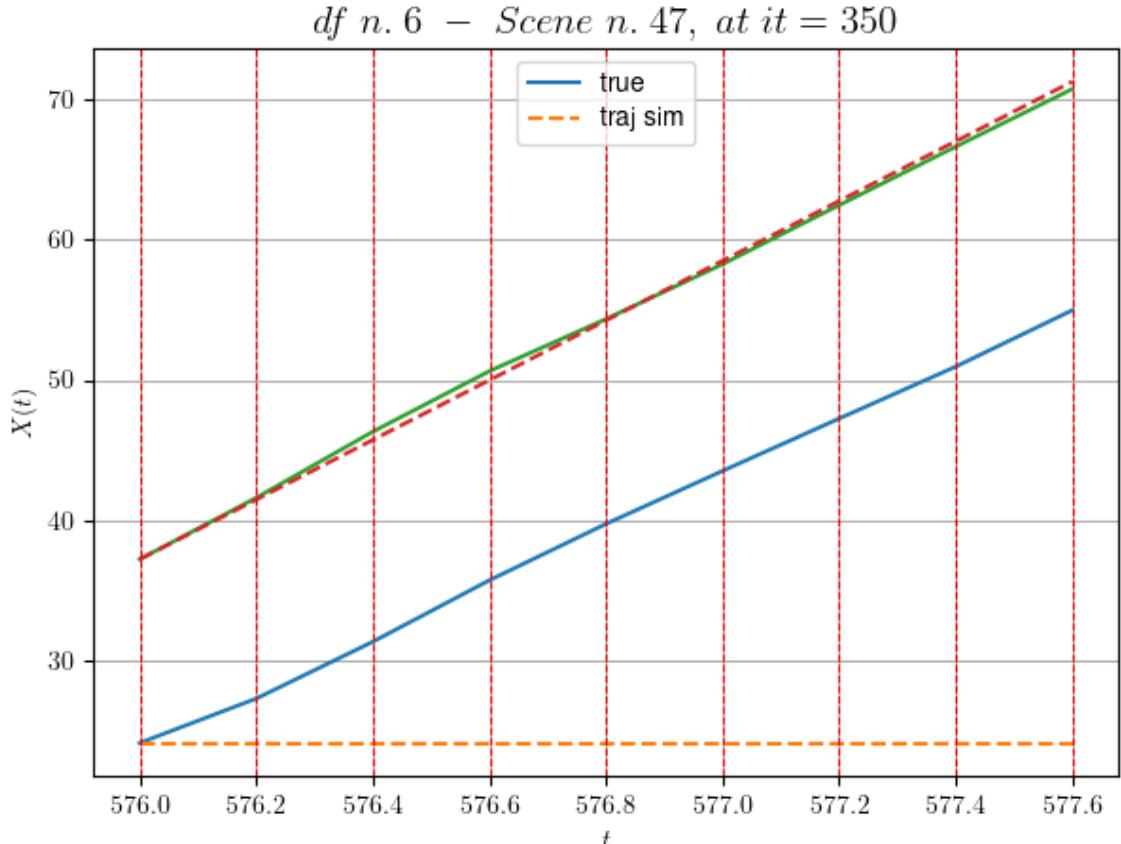


For scene 11/34:

* After LR finder: LR_NN=5e-05 with mse=0.11850250858086185
at it=24
* v0 = 29.05713292292848
* MSE = 79.74909505420635
* iterations = 200

DataFrame n.6. Scene n.12/34

We have 8 time intervals inside [576.00,577.60]

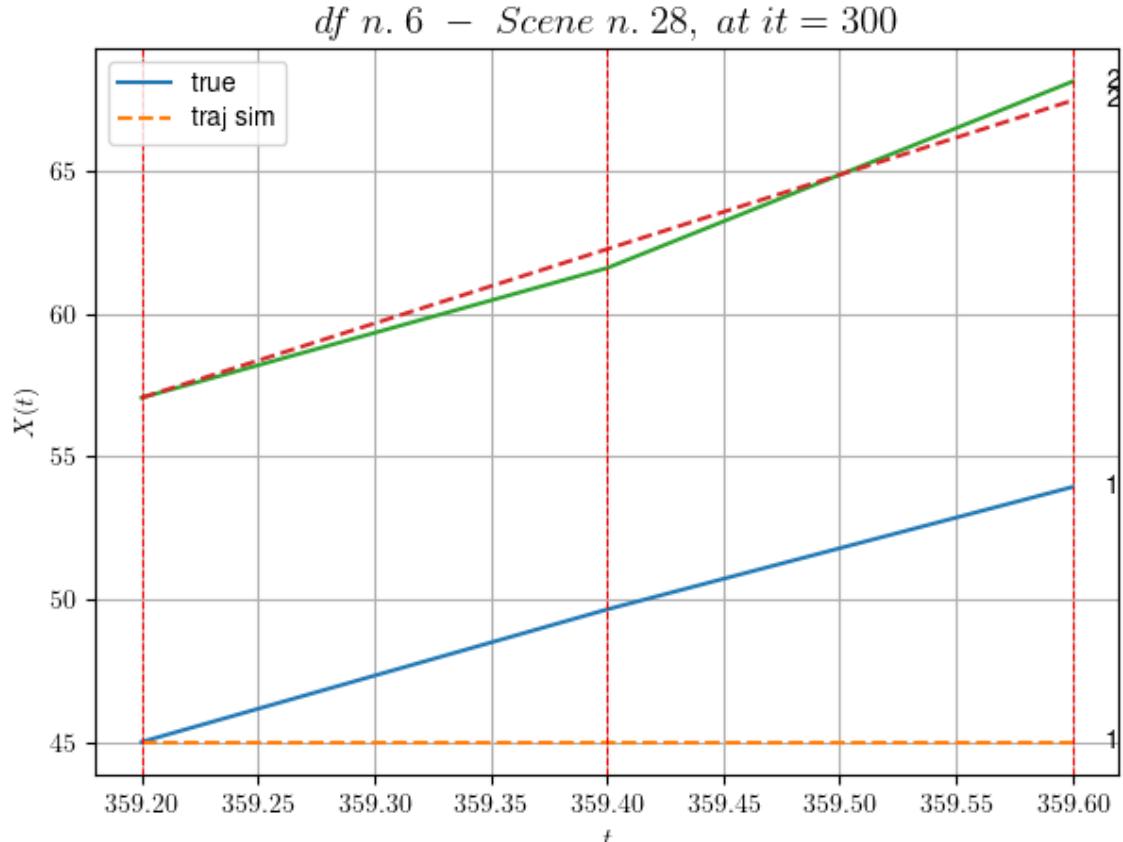


For scene 12/34:

* After LR finder: LR_NN=0.001 with mse=35.6236841695398 at
it=24
* v0 = 21.301030766395836
* MSE = 168.29360710642132
* iterations = 350

DataFrame n.6. Scene n.13/34

We have 2 time intervals inside [359.20,359.60]



For scene 13/34:

* After LR finder: LR_NN=0.0005 with mse=0.5029094348952488

at it=24

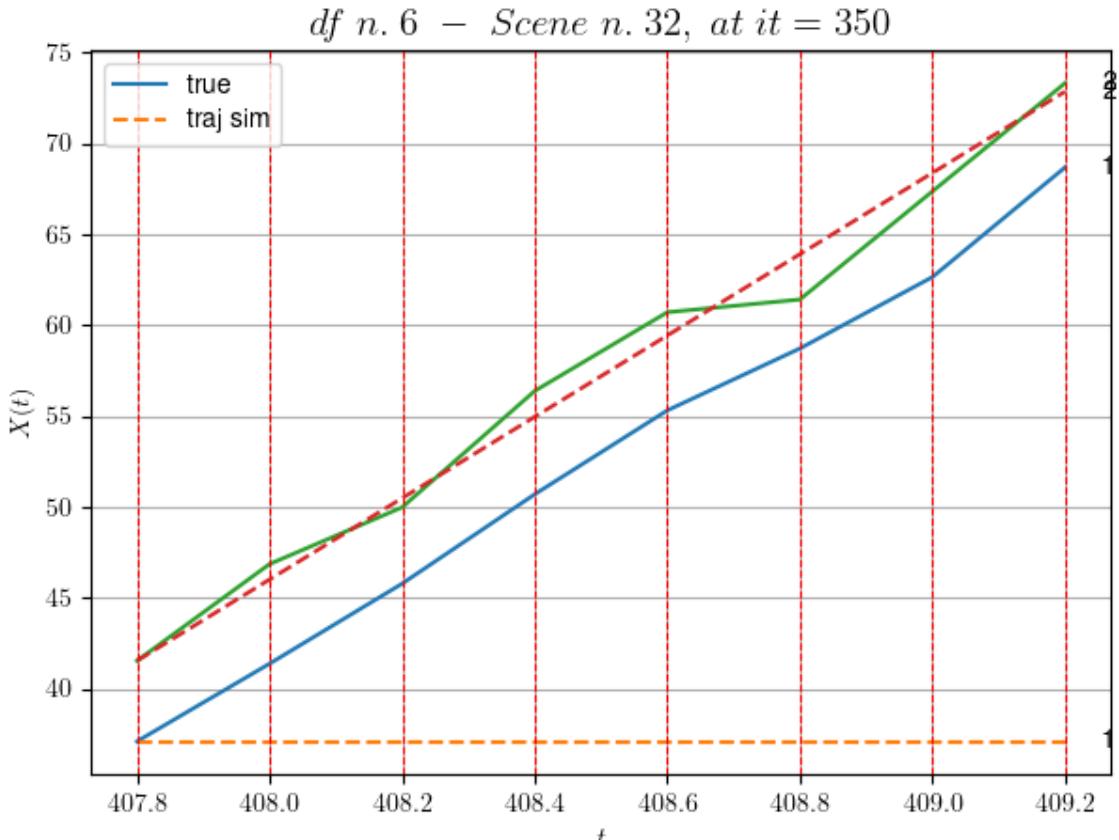
* v0 = 26.036962679722613

* MSE = 17.02201408153236

* iterations = 300

DataFrame n.6. Scene n.14/34

We have 7 time intervals inside [407.80,409.20]

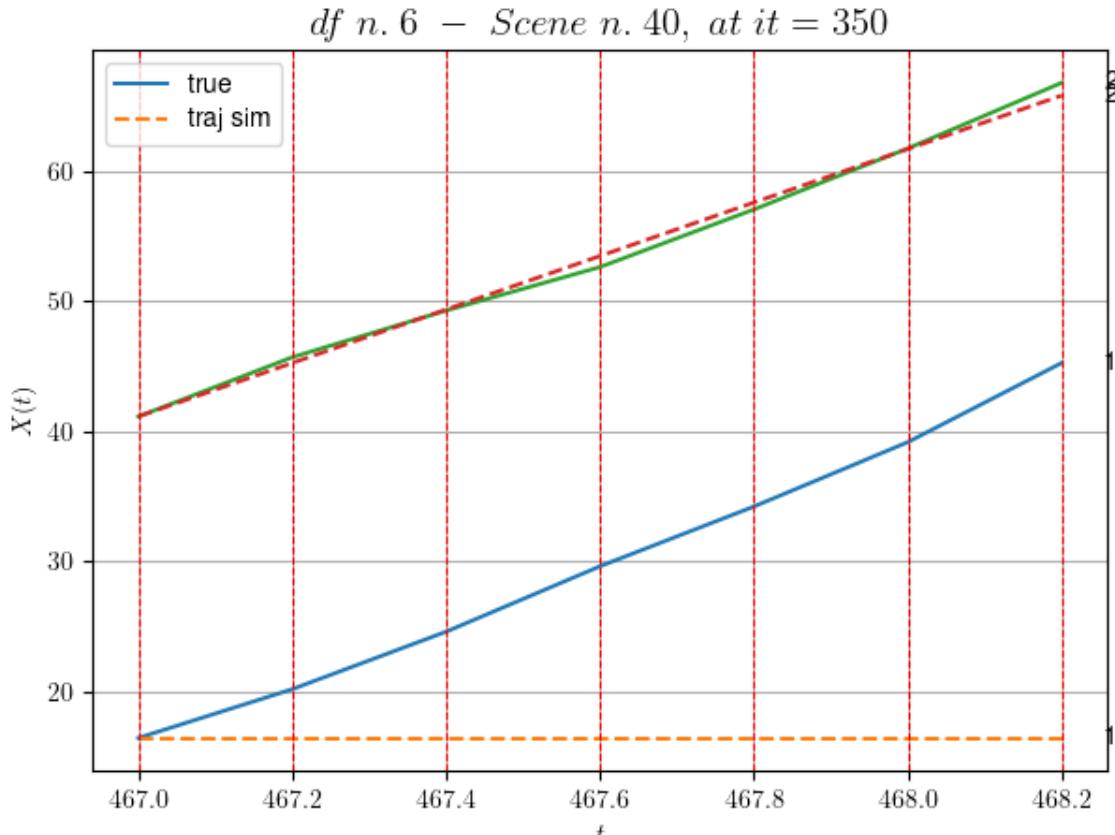


For scene 14/34:

- * After LR finder: $LR_NN=0.0001$ with $mse=22.643868785099833$
- at $it=24$
- * $v_0 = 22.363716426820204$
- * $MSE = 171.14223728095652$
- * iterations = 350

DataFrame n.6. Scene n.15/34

We have 6 time intervals inside [467.00, 468.20]

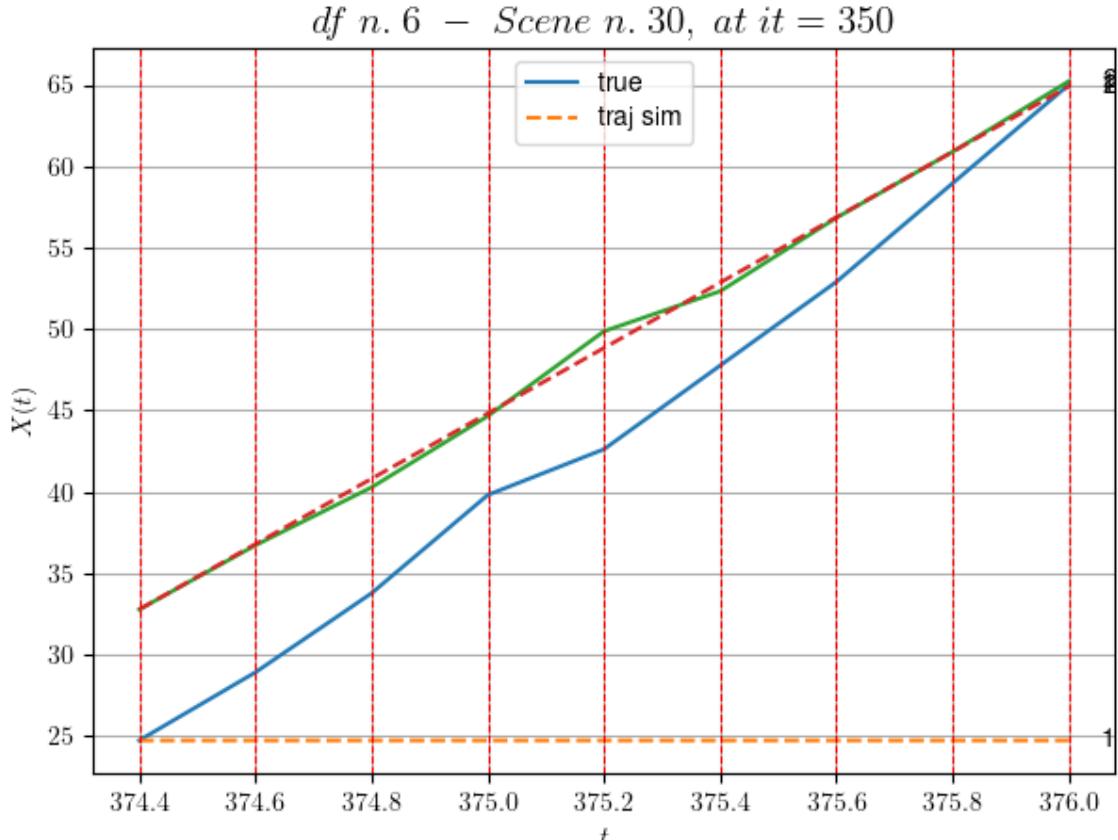


For scene 15/34:

- * After LR finder: LR_NN=0.0005 with mse=23.885010055899272
- at it=24
- * v0 = 20.547439360583393
- * MSE = 137.04289294615015
- * iterations = 350

DataFrame n.6. Scene n.16/34

We have 8 time intervals inside [374.40,376.00]

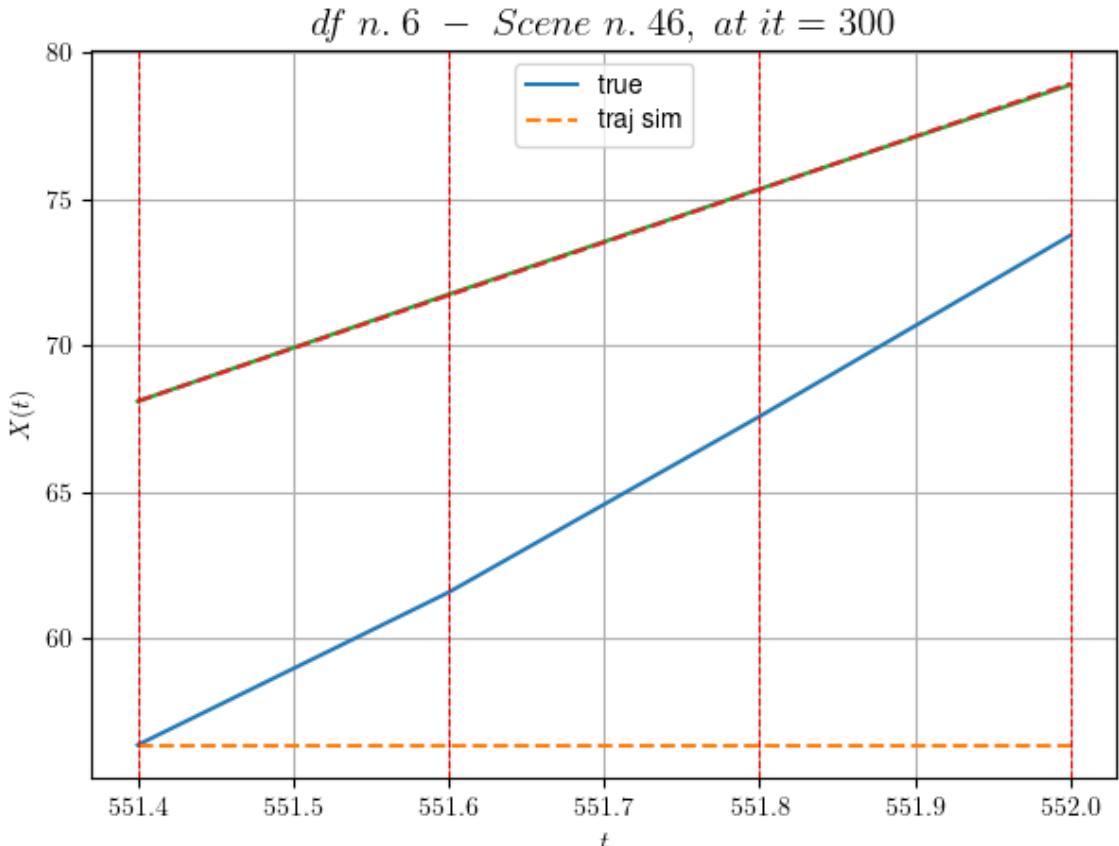


For scene 16/34:

* After LR finder: LR_NN=5e-05 with mse=48.18956985378308 at it=24
* v0 = 20.07369705275156
* MSE = 264.5636762719591
* iterations = 350

DataFrame n.6. Scene n.17/34

We have 3 time intervals inside [551.40,552.00]

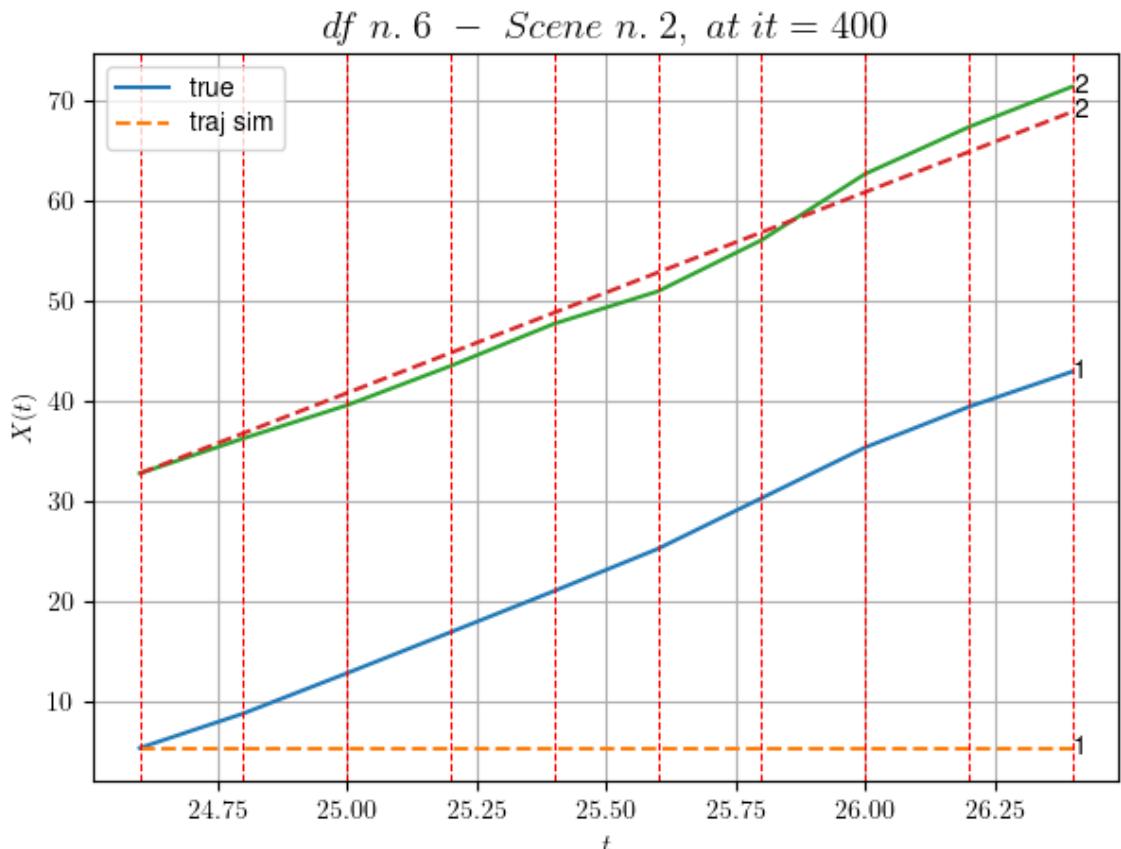


For scene 17/34:

* After LR finder: LR_NN=0.0001 with mse=10.436933087948052
at it=24
* v0 = 18.10266114839419
* MSE = 57.100809170580476
* iterations = 300

DataFrame n.6. Scene n.18/34

We have 9 time intervals inside [24.60,26.40]

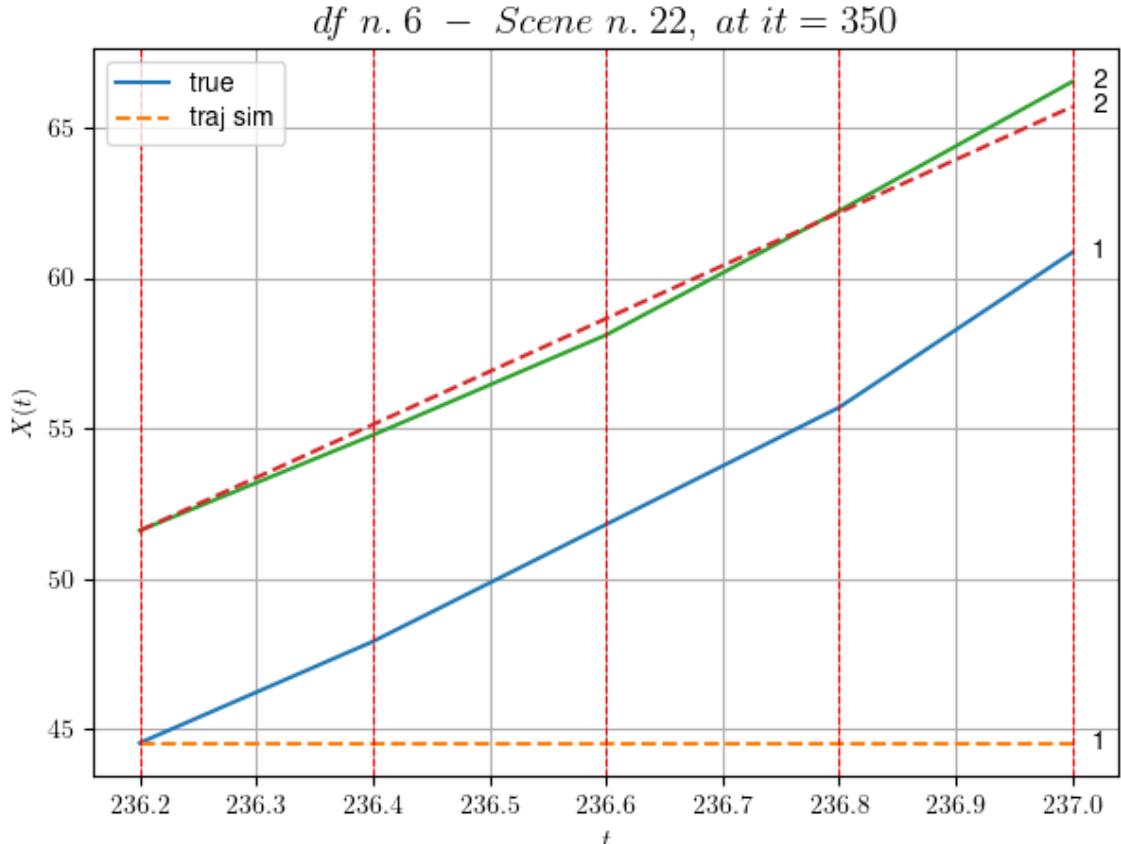


For scene 18/34:

* After LR finder: LR_NN=5e-05 with mse=51.85387197112232 at it=24
* v0 = 20.07254373855542
* MSE = 248.22591175425433
* iterations = 400

DataFrame n.6. Scene n.19/34

We have 4 time intervals inside [236.20,237.00]

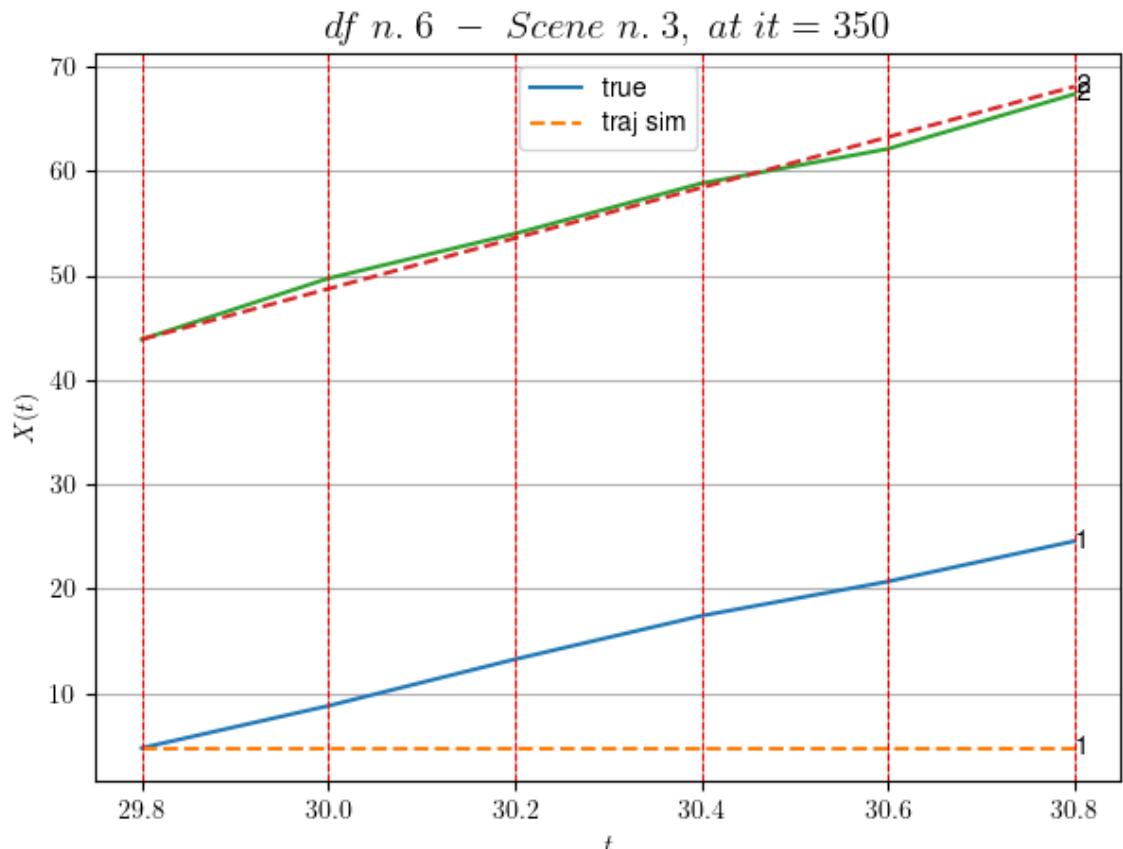


For scene 19/34:

* After LR finder: LR_NN=0.0001 with mse=17.706318336438624
at it=24
* $v_0 = 17.634131182349652$
* MSE = 45.64276709651508
* iterations = 350

DataFrame n.6. Scene n.20/34

We have 5 time intervals inside [29.80,30.80]

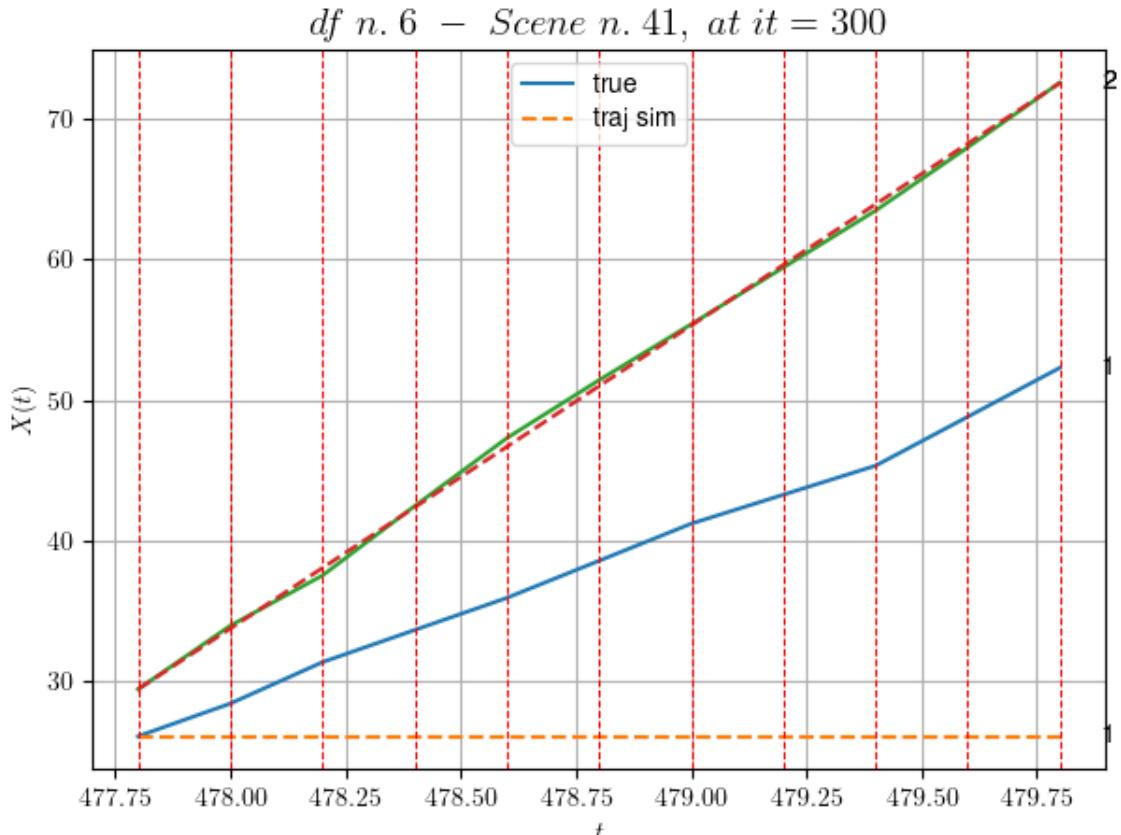


For scene 20/34:

* After LR finder: LR_NN=0.0005 with mse=7.439426946818623
at it=24
* v0 = 24.207929143818735
* MSE = 74.79455734398796
* iterations = 350

DataFrame n.6. Scene n.21/34

We have 10 time intervals inside [477.80, 479.80]

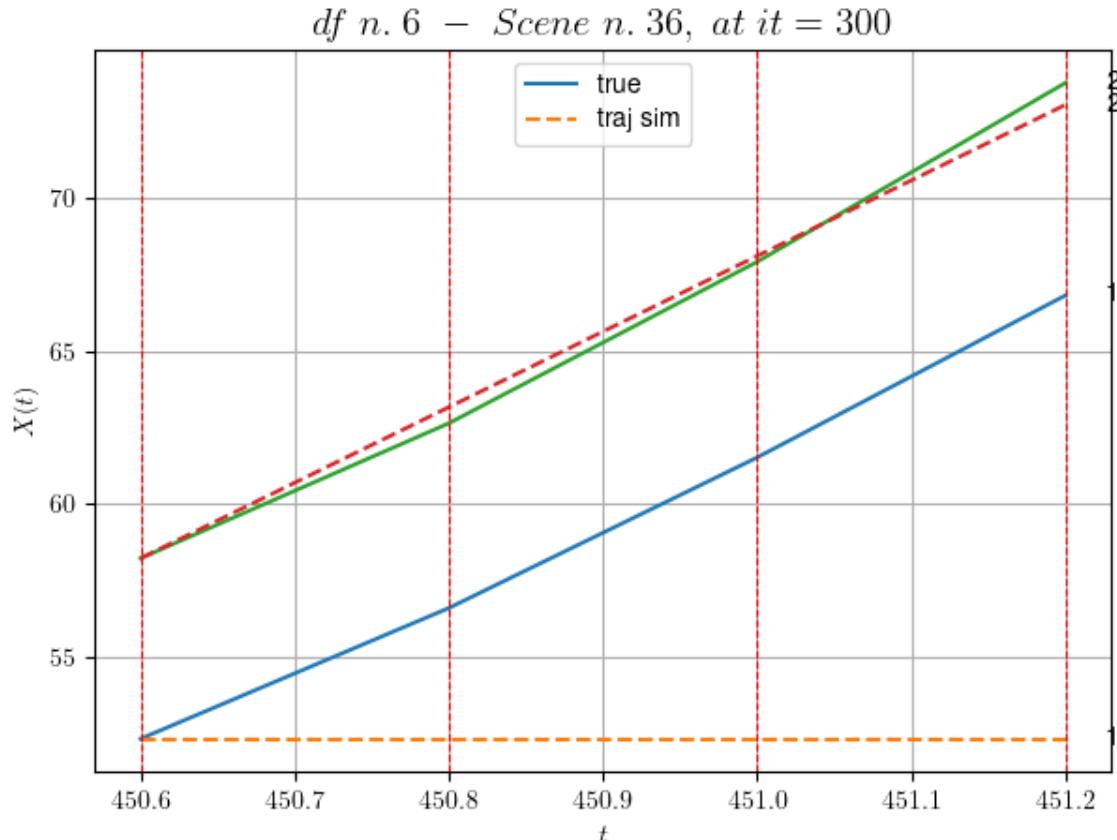


For scene 21/34:

- * After LR finder: LR_NN=0.001 with mse=54.36567313625568 at it=24
- * v0 = 21.601432745709985
- * MSE = 111.41832597147963
- * iterations = 300

DataFrame n.6. Scene n.22/34

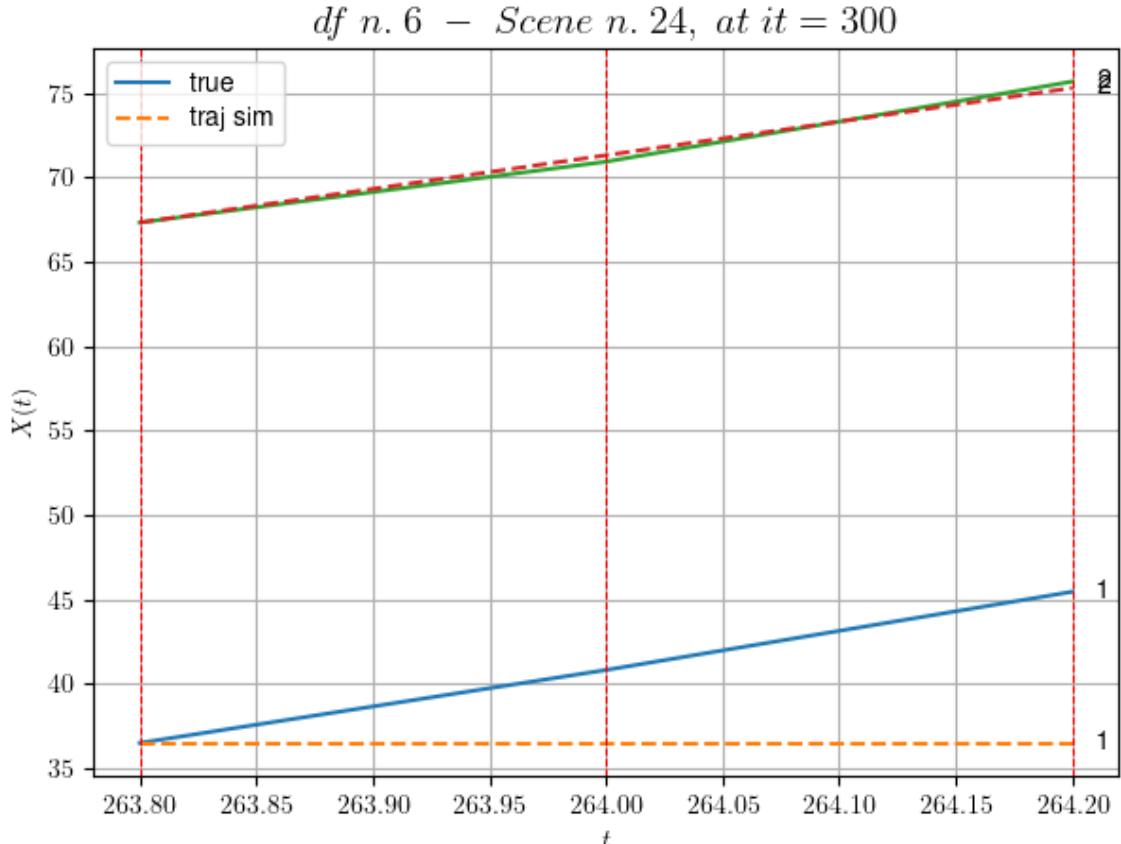
We have 3 time intervals inside [450.60,451.20]



For scene 22/34:
* After LR finder: LR_NN=0.0005 with mse=1.7725656356380337
at it=24
* v0 = 24.707839283039405
* MSE = 39.209718472390286
* iterations = 300

DataFrame n.6. Scene n.23/34

We have 2 time intervals inside [263.80, 264.20]

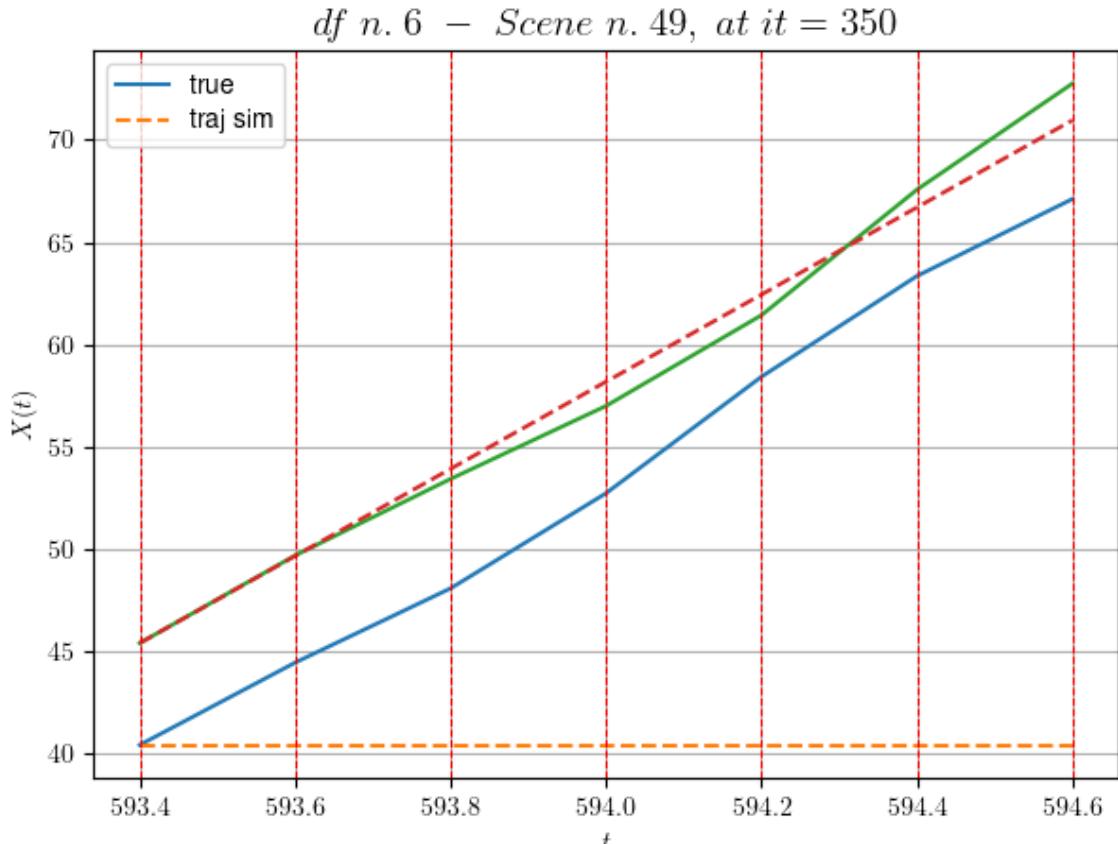


For scene 23/34:

* After LR finder: LR_NN=0.0005 with mse=3.2285213646335102
at it=24
* v0 = 19.93862625815393
* MSE = 16.55454463050597
* iterations = 300

DataFrame n.6. Scene n.24/34

We have 6 time intervals inside [593.40,594.60]



For scene 24/34:

* After LR finder: $LR_NN=0.001$ with $mse=19.604281868921117$

at it=24

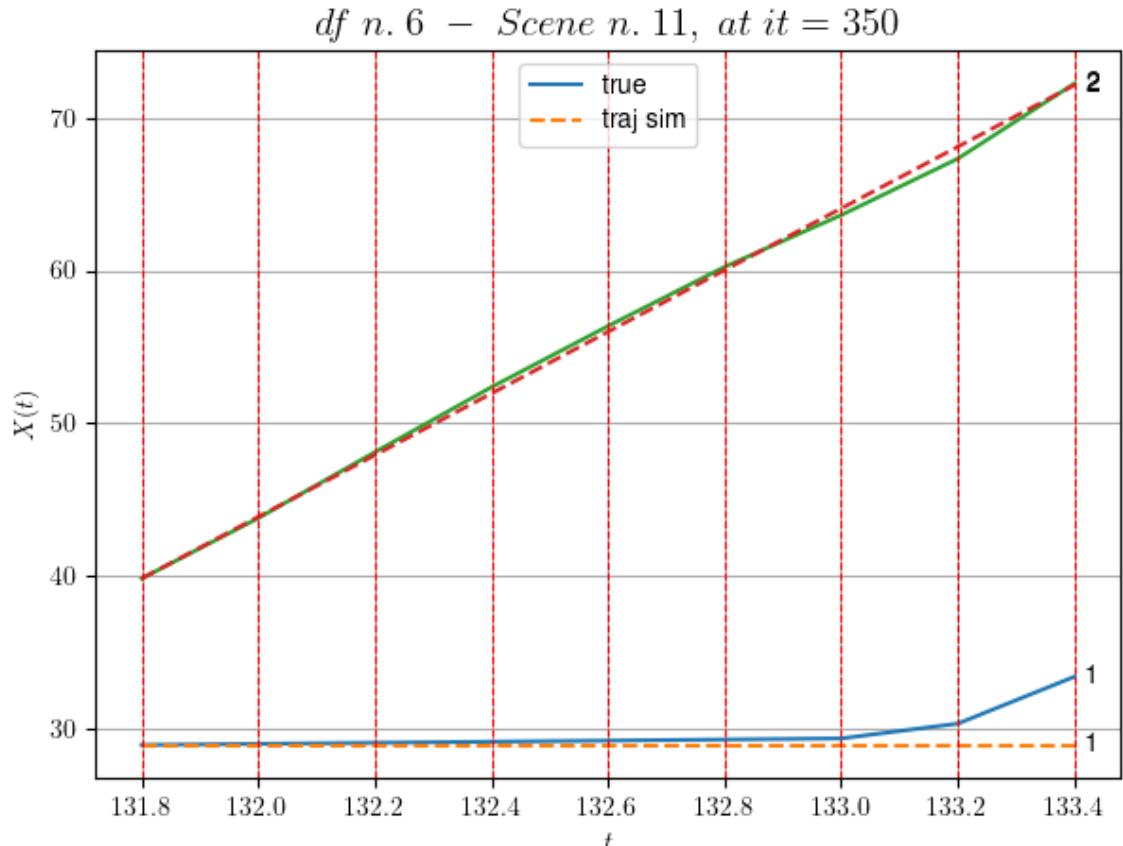
* $v_0 = 21.280810054810107$

* MSE = 127.92409480111004

* iterations = 350

DataFrame n.6. Scene n.25/34

We have 8 time intervals inside [131.80,133.40]

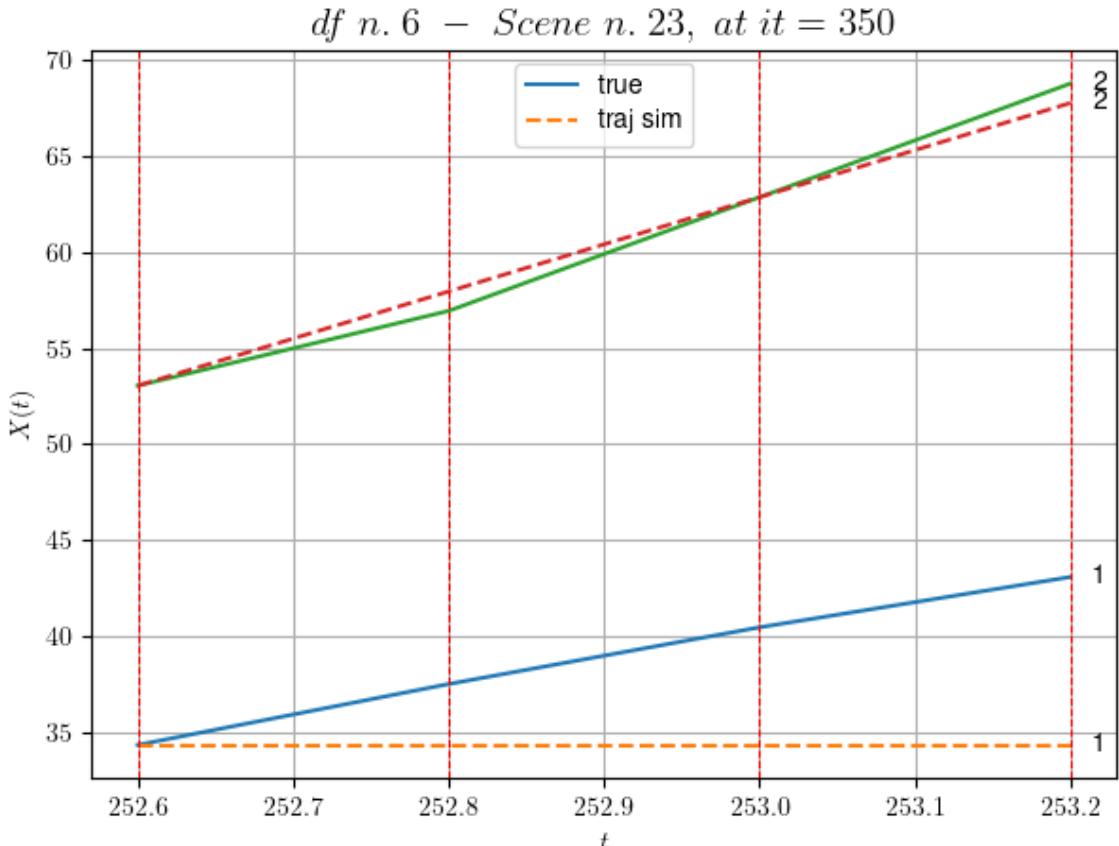


For scene 25/34:

* After LR finder: LR_NN=0.01 with mse=45.33367048525571 at
it=24
* $v_0 = 20.22300048803772$
* MSE = 1.3154186642760677
* iterations = 350

DataFrame n.6. Scene n.26/34

We have 3 time intervals inside [252.60,253.20]

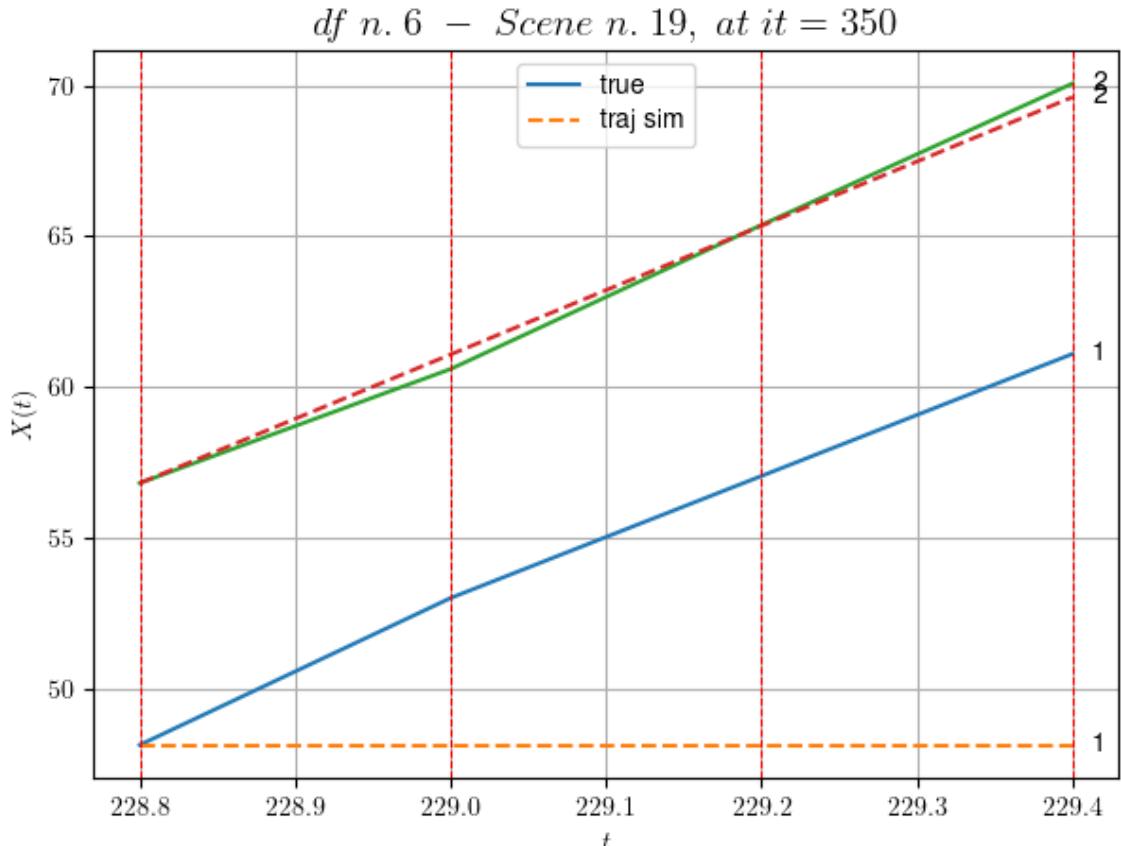


For scene 26/34:

* After LR finder: LR_NN=0.0001 with mse=1.9177210424325086
at it=24
* v0 = 24.514205540242504
* MSE = 15.706991118354887
* iterations = 350

DataFrame n.6. Scene n.27/34

We have 3 time intervals inside [228.80,229.40]

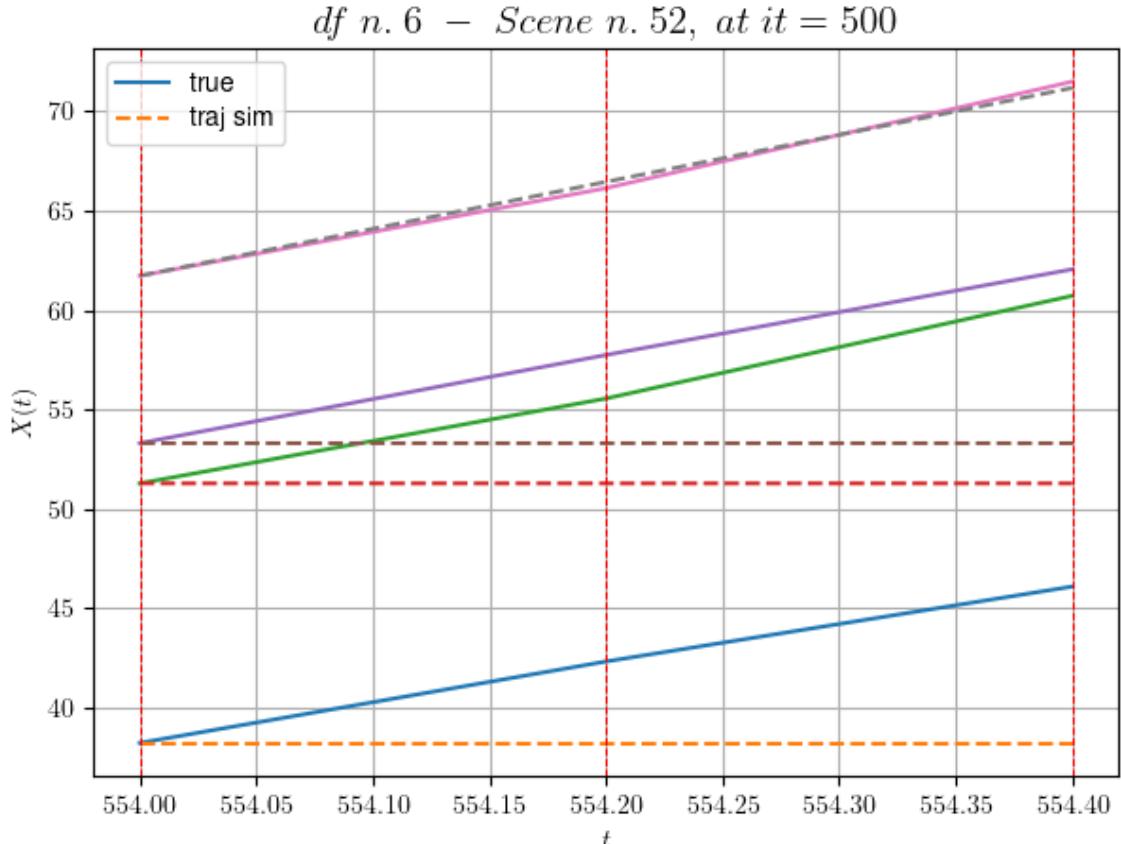


For scene 27/34:

* After LR finder: LR_NN=0.0005 with mse=4.960609850536696
at it=24
* v0 = 21.319904979846683
* MSE = 33.945090036770566
* iterations = 350

DataFrame n.6. Scene n.28/34

We have 2 time intervals inside [554.00,554.40]



For scene 28/34:

* After LR finder: LR_NN=0.001 with mse=6.024083114016398 at it=24
* v0 = 23.647050620331452
* MSE = 23.554138311928533
* iterations = 500

DataFrame n.6. Scene n.29/34

We have 3 time intervals inside [234.00,234.60]

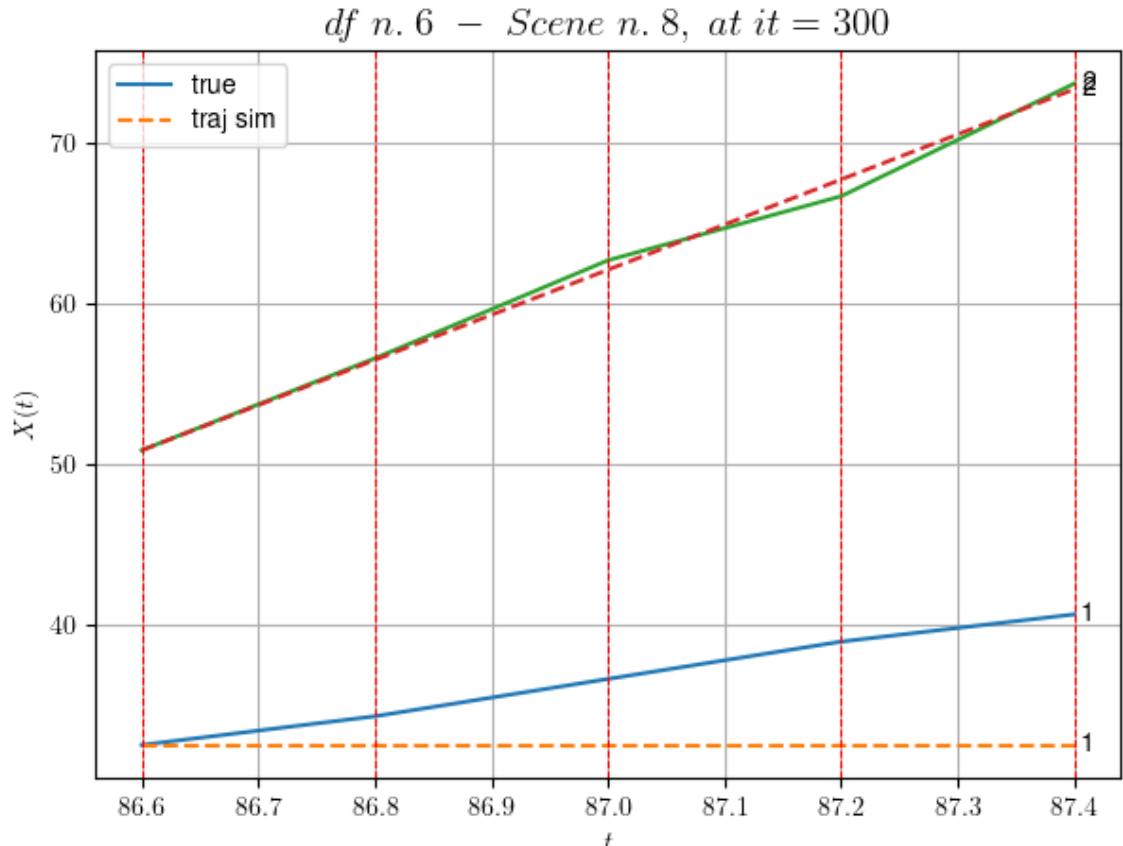


For scene 29/34:

* After LR finder: LR_NN=1e-05 with mse=7.3714649541606105
at it=24
* v0 = 20.201368997739912
* MSE = 36.510009283372106
* iterations = 300

DataFrame n.6. Scene n.30/34

We have 4 time intervals inside [86.60,87.40]

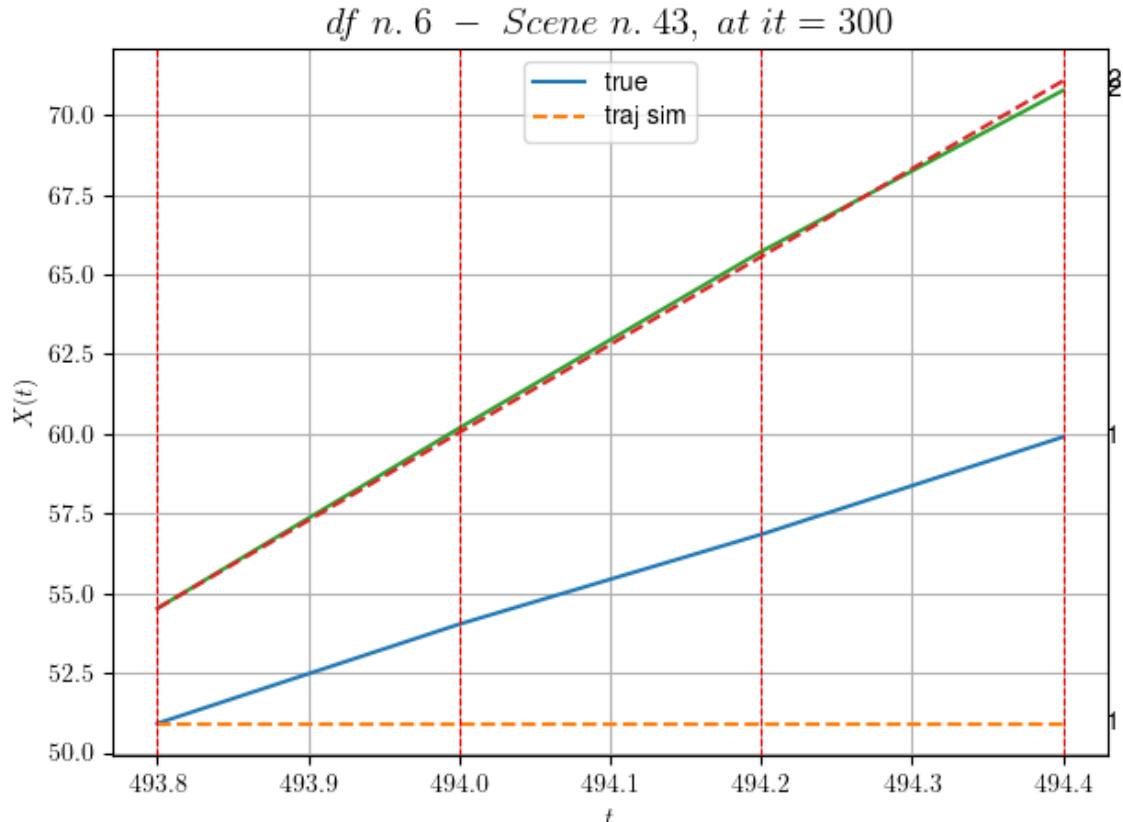


For scene 30/34:

* After LR finder: LR_NN=5e-05 with mse=0.8245511359991208
at it=24
* v0 = 28.176915561930645
* MSE = 12.983827742689842
* iterations = 300

DataFrame n.6. Scene n.31/34

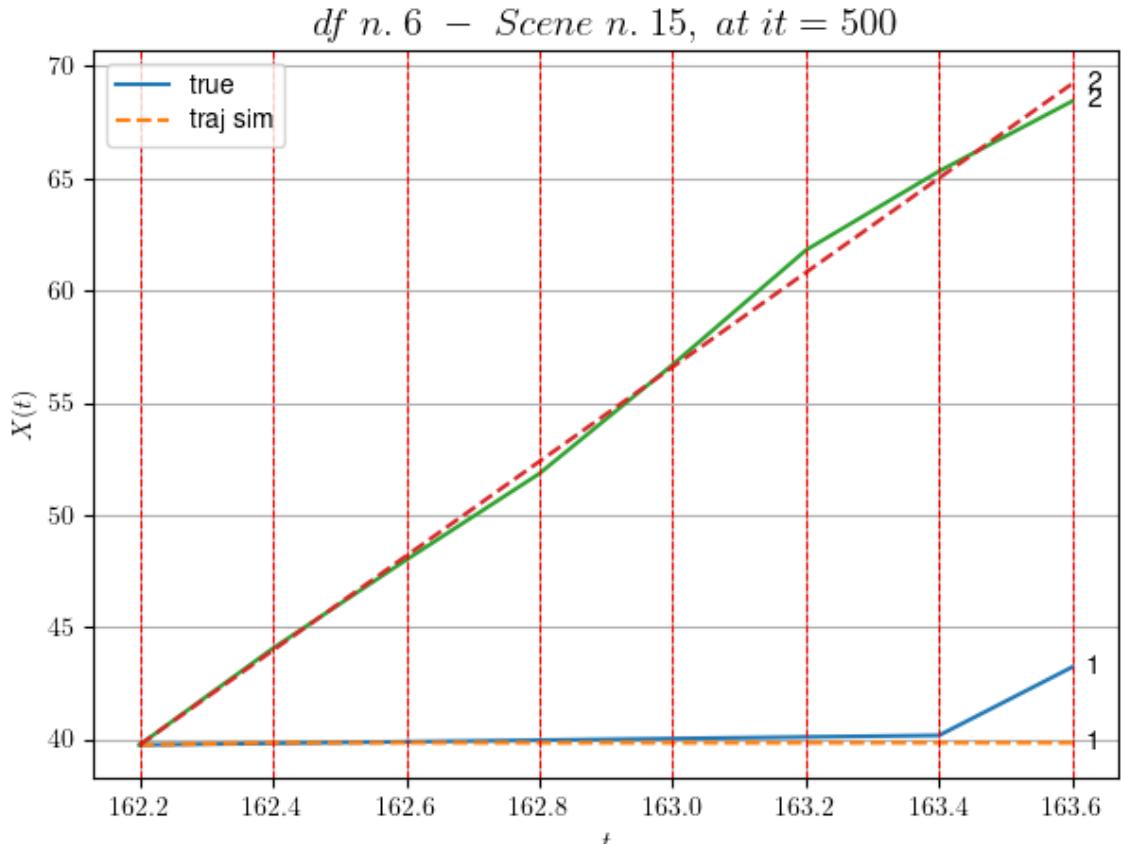
We have 3 time intervals inside [493.80,494.40]



For scene 31/34:
* After LR finder: LR_NN=0.005 with mse=0.8726136806877116
at it=24
* v0 = 27.577028073805153
* MSE = 15.70948591165041
* iterations = 300

DataFrame n.6. Scene n.32/34

We have 7 time intervals inside [162.20,163.60]

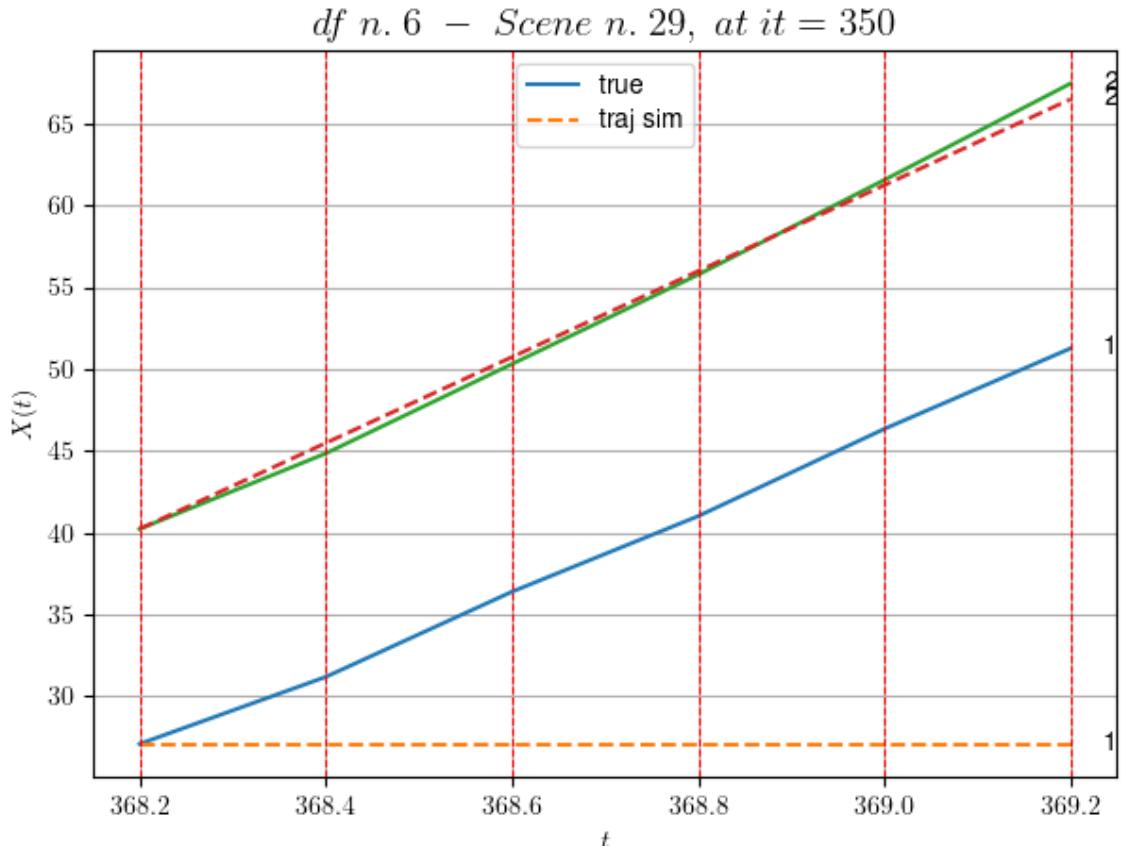


For scene 32/34:

* After LR finder: LR_NN=0.01 with mse=28.733227390432333 at it=24
* v0 = 21.059787487615633
* MSE = 0.8262019272149923
* iterations = 500

DataFrame n.6. Scene n.33/34

We have 5 time intervals inside [368.20,369.20]

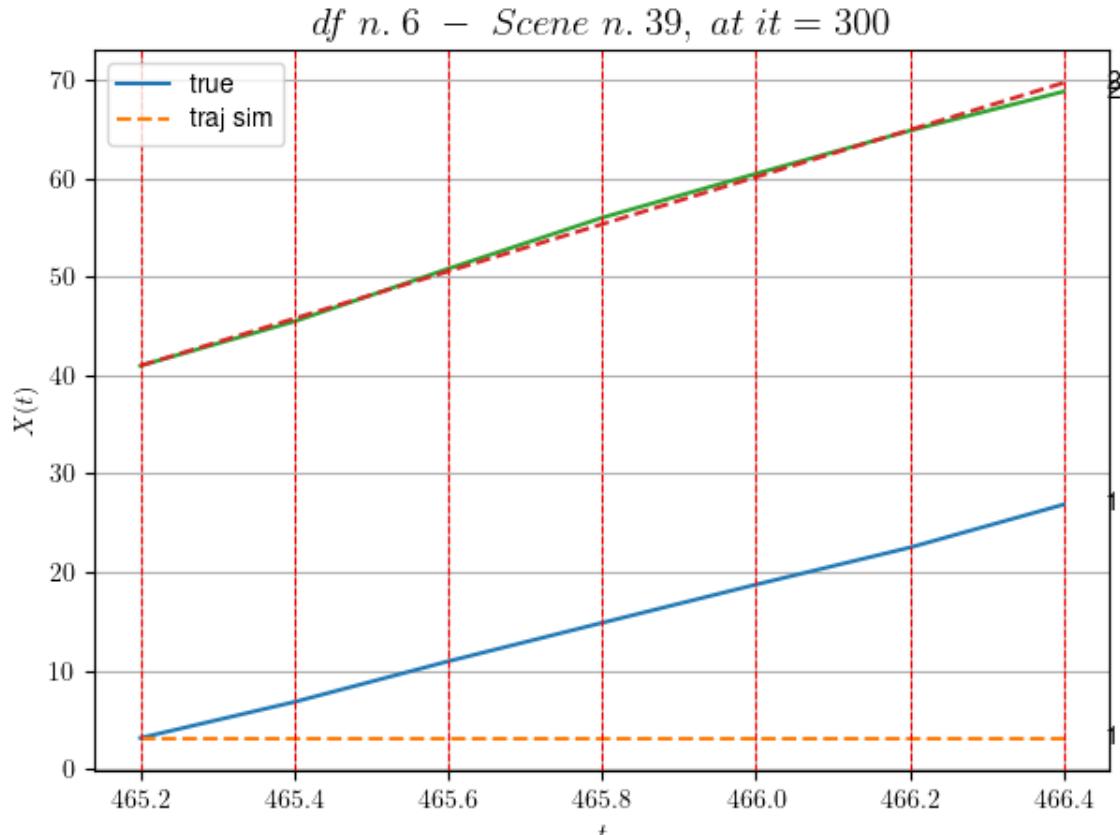


For scene 33/34:

```
* After LR finder: LR_NN=5e-05 with mse=2.230514385986072 at it=24
* vθ = 26.26965467684627
* MSE = 104.49110769882134
* iterations = 350
```

DataFrame n.6. Scene n.34/34

We have 6 time intervals inside [465.20,466.40]

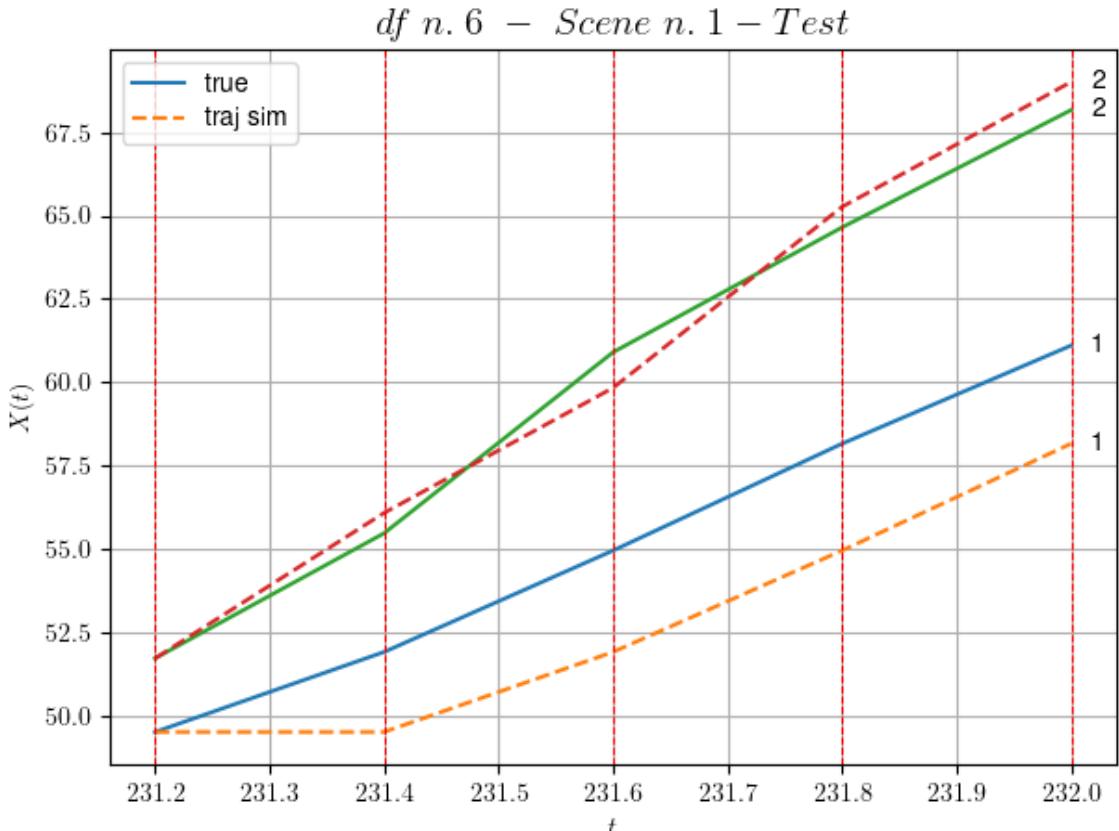


For scene 34/34:
* After LR finder: LR_NN=5e-05 with mse=9.993454819188674 at it=24
* v0 = 23.95696377887453
* MSE = 99.4160222286852
* iterations = 300

MSE train: 65.19921256703435

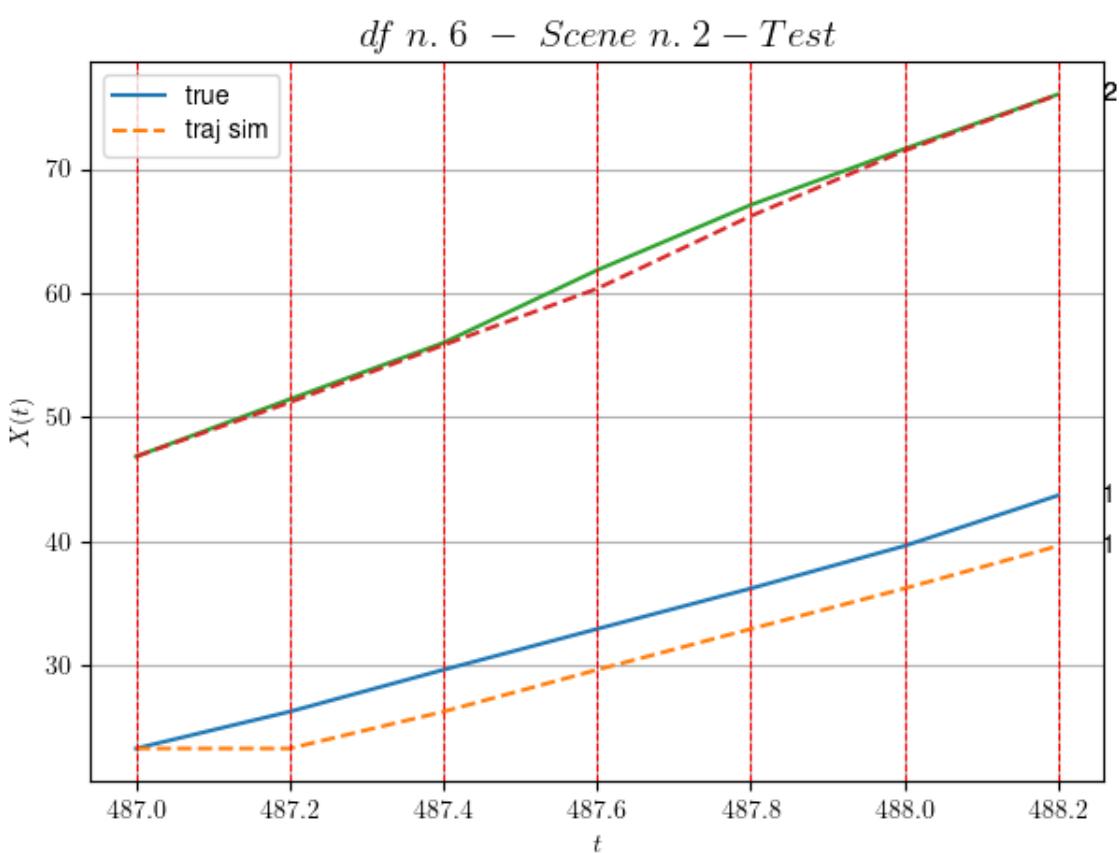
Testing step. (18 scenes)

DataFrame n.6. Scene n.1/18



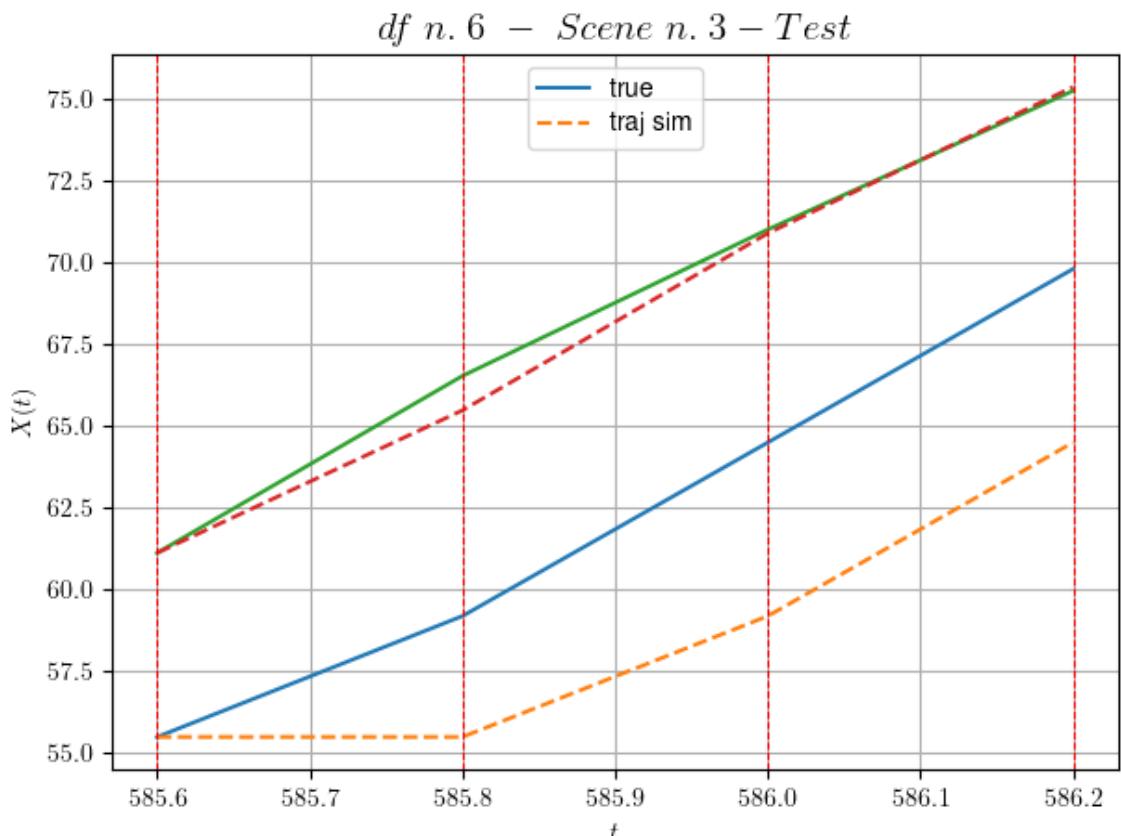
For scene 1/18:
* MSE = 3.6579635040218585

DataFrame n. 6. Scene n. 2/18



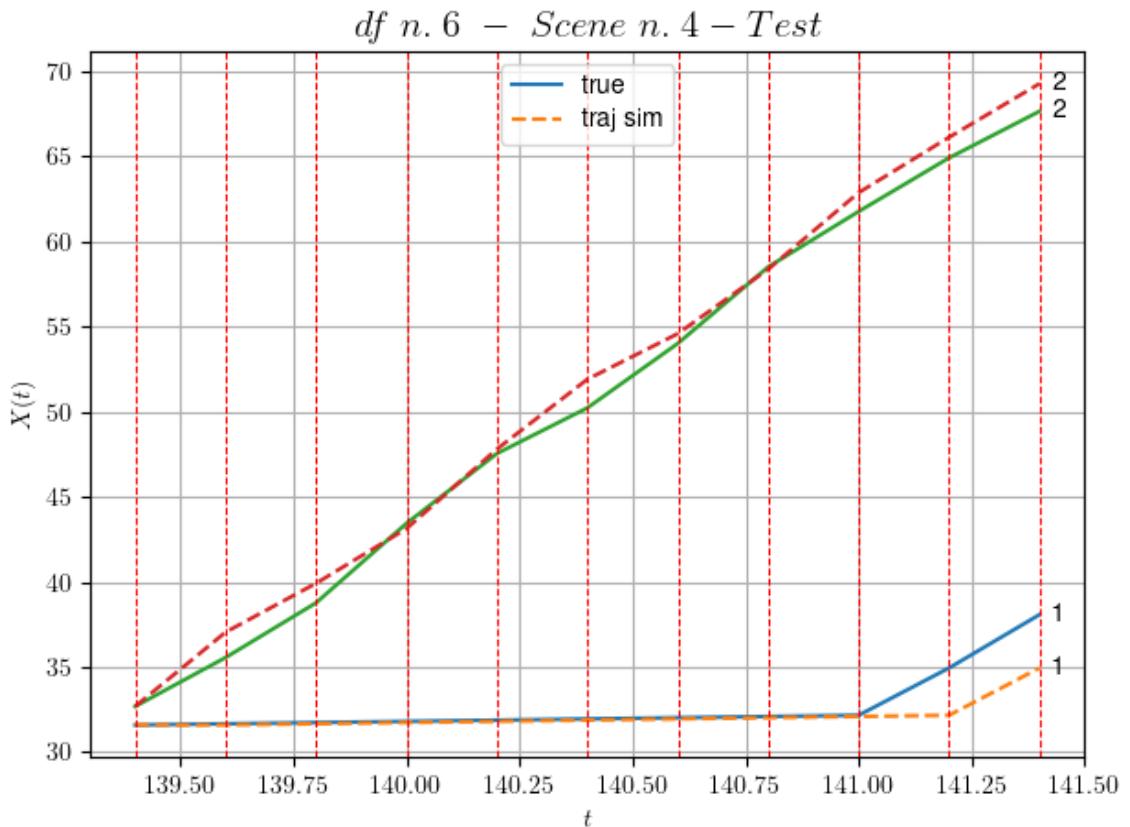
For scene 2/18:
* MSE = 5.227586714598567

DataFrame n.6. Scene n.3/18



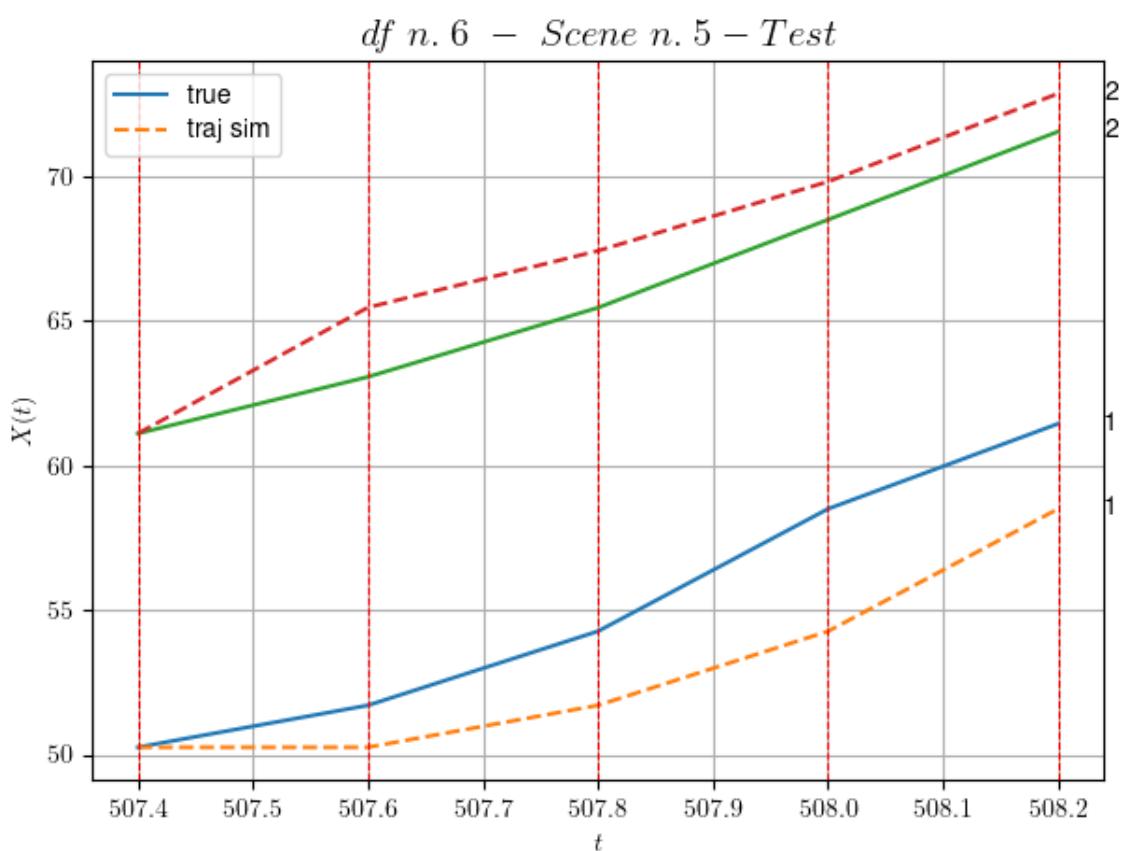
For scene 3/18:
* MSE = 8.903695035729463

DataFrame n.6. Scene n.4/18



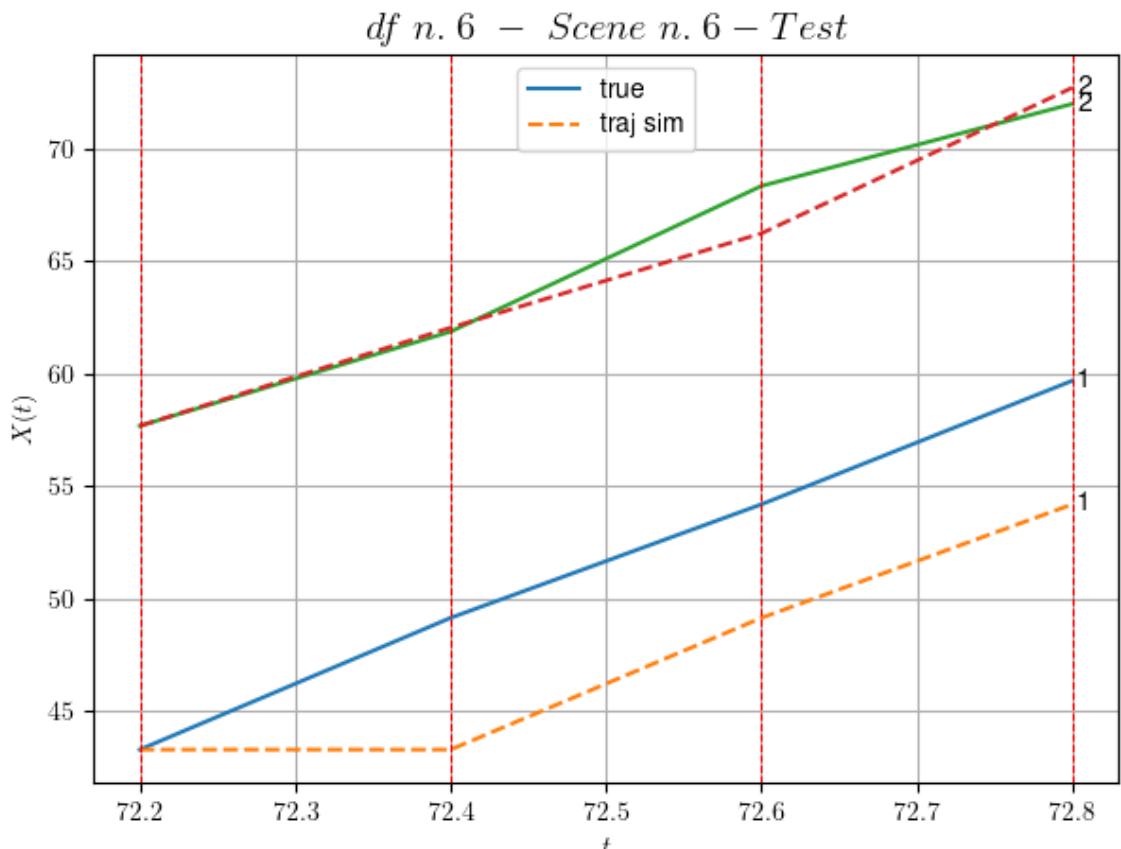
For scene 4/18:
* MSE = 1.3549115762290018

DataFrame n.6. Scene n.5/18



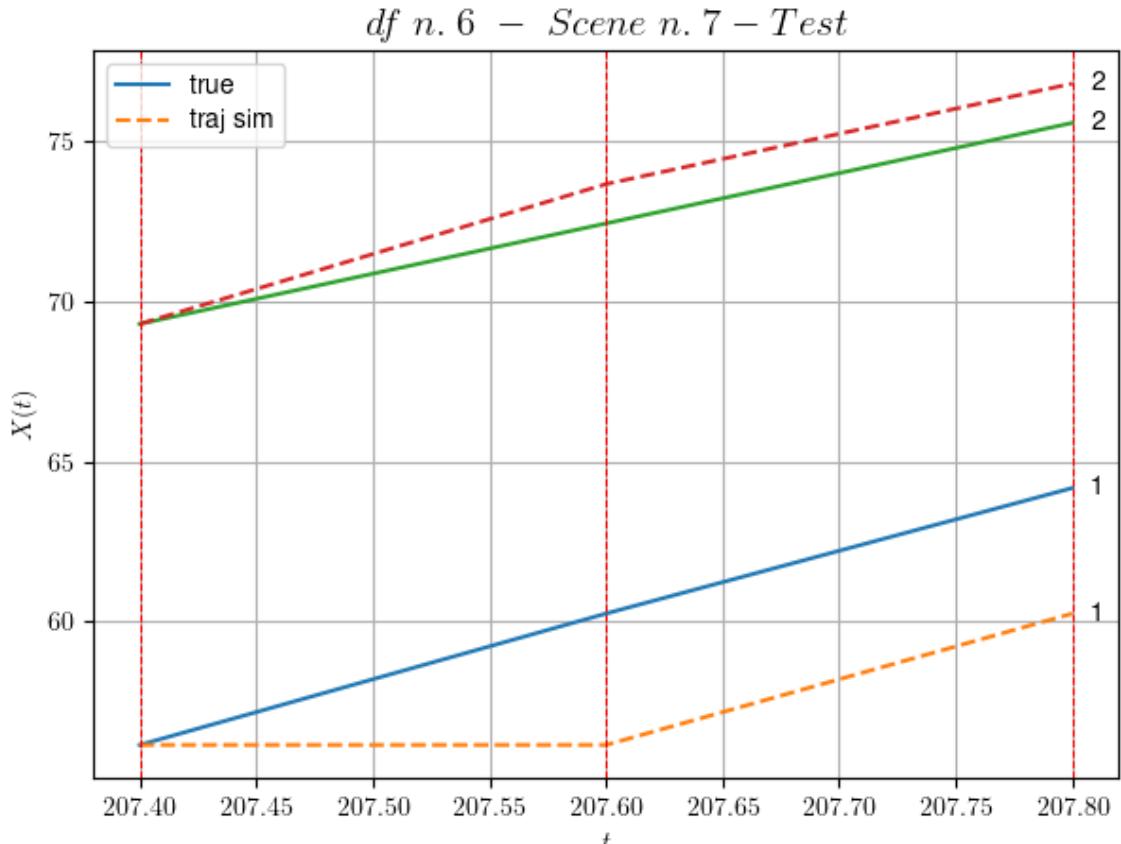
For scene 5/18:
* MSE = 4.838914611451531

DataFrame n.6. Scene n.6/18



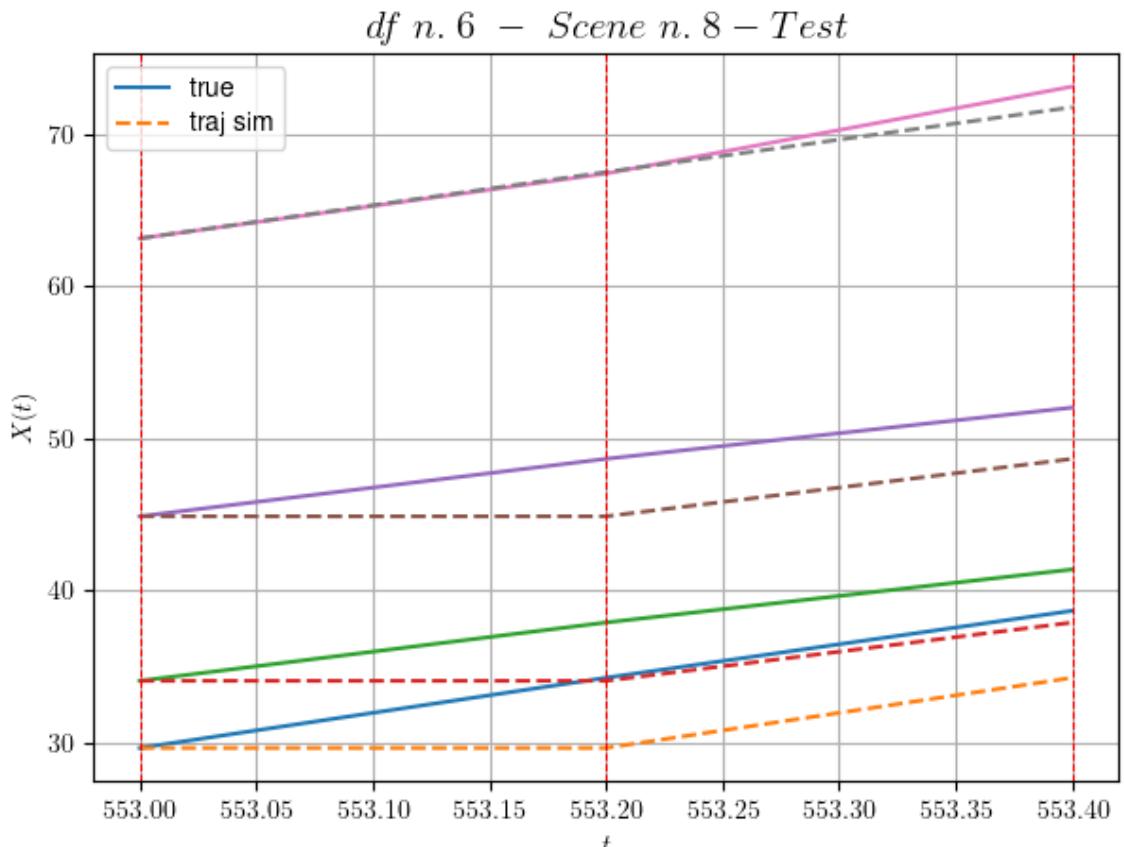
For scene 6/18:
* MSE = 11.840028711084642

DataFrame n.6. Scene n.7/18



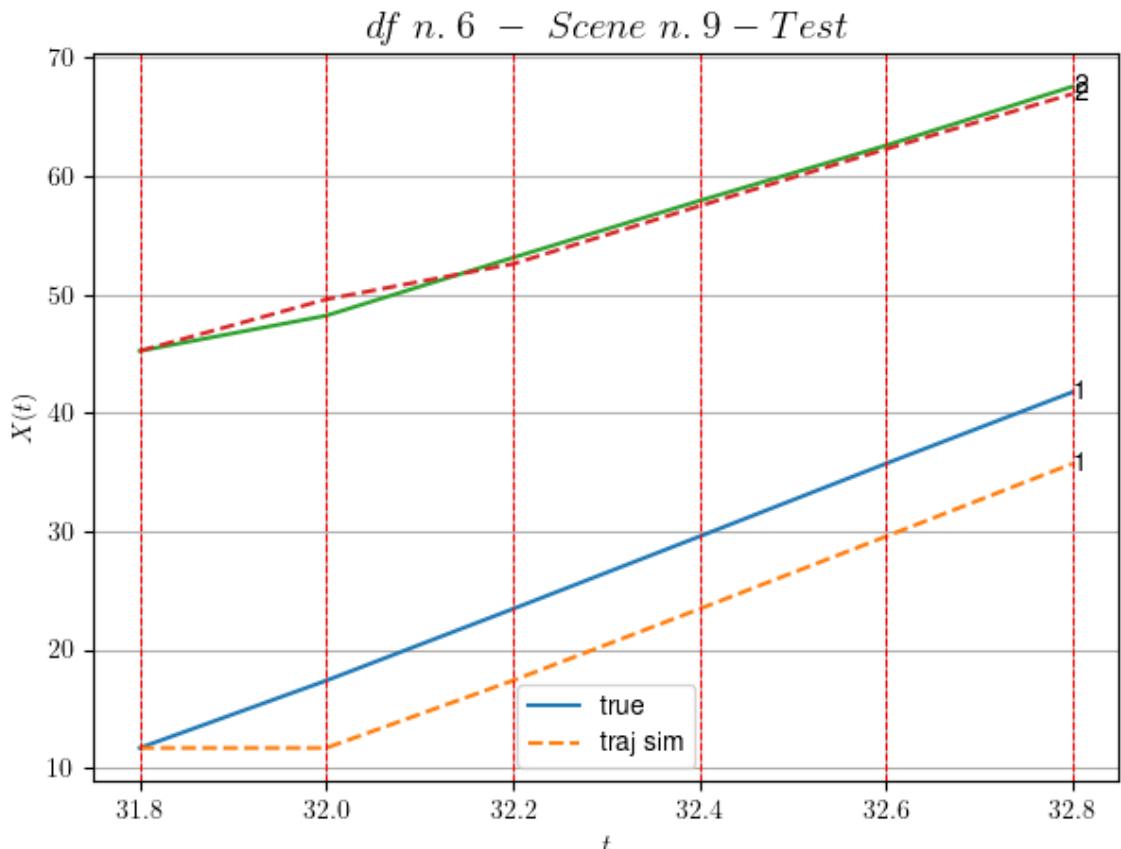
For scene 7/18:
* MSE = 5.855959230752423

DataFrame n.6. Scene n.8/18



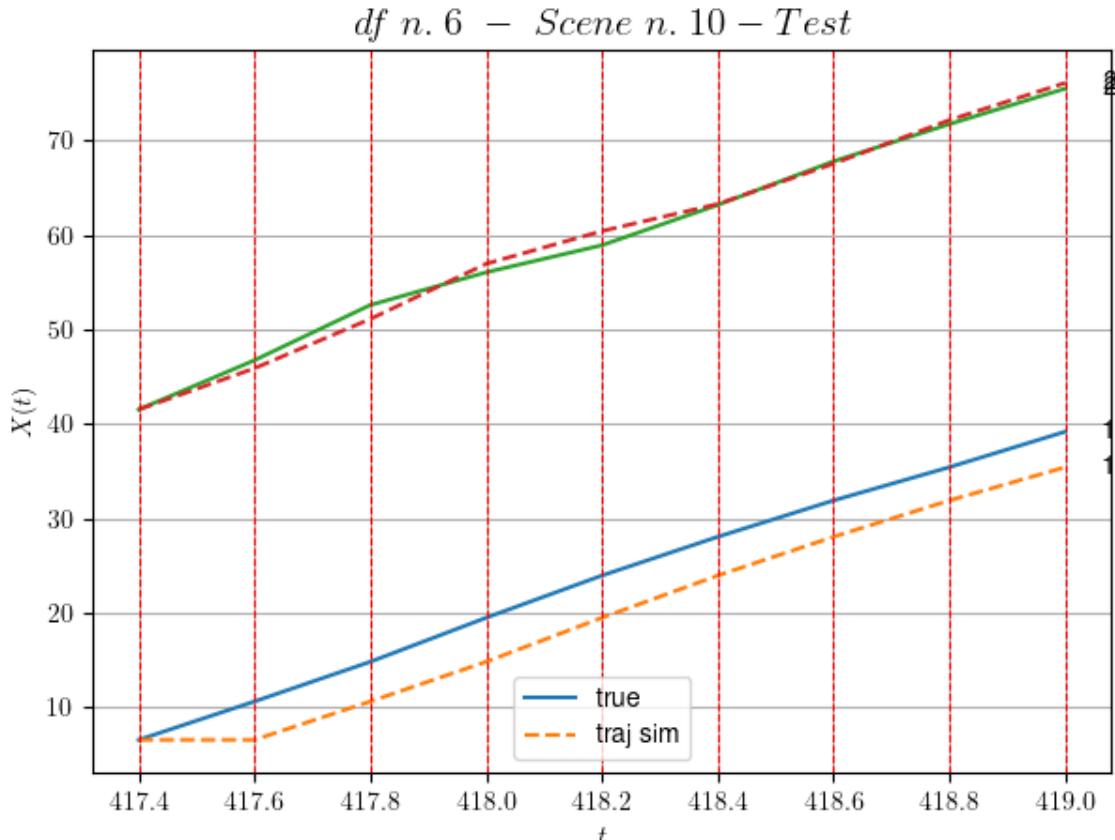
For scene 8/18:
* MSE = 7.924642019507557

DataFrame n.6. Scene n.9/18



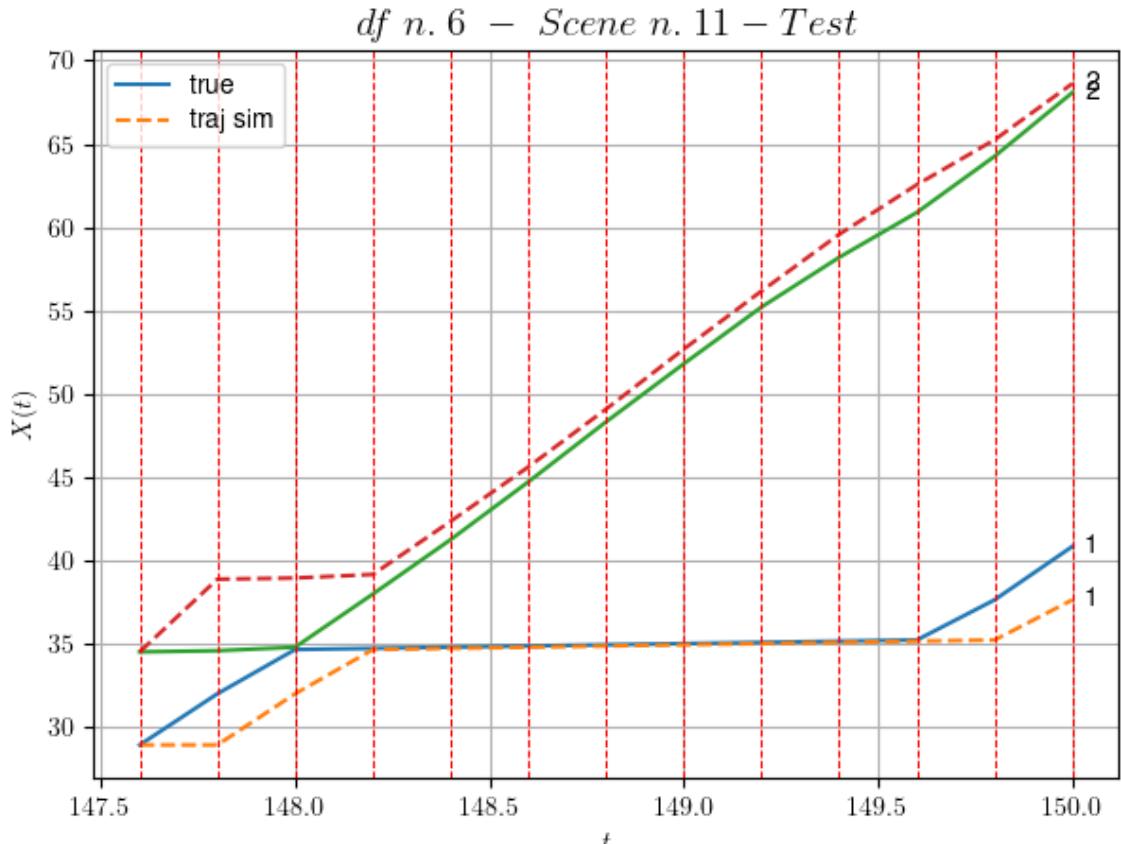
For scene 9/18:
* MSE = 15.310443432345497

DataFrame n.6. Scene n.10/18

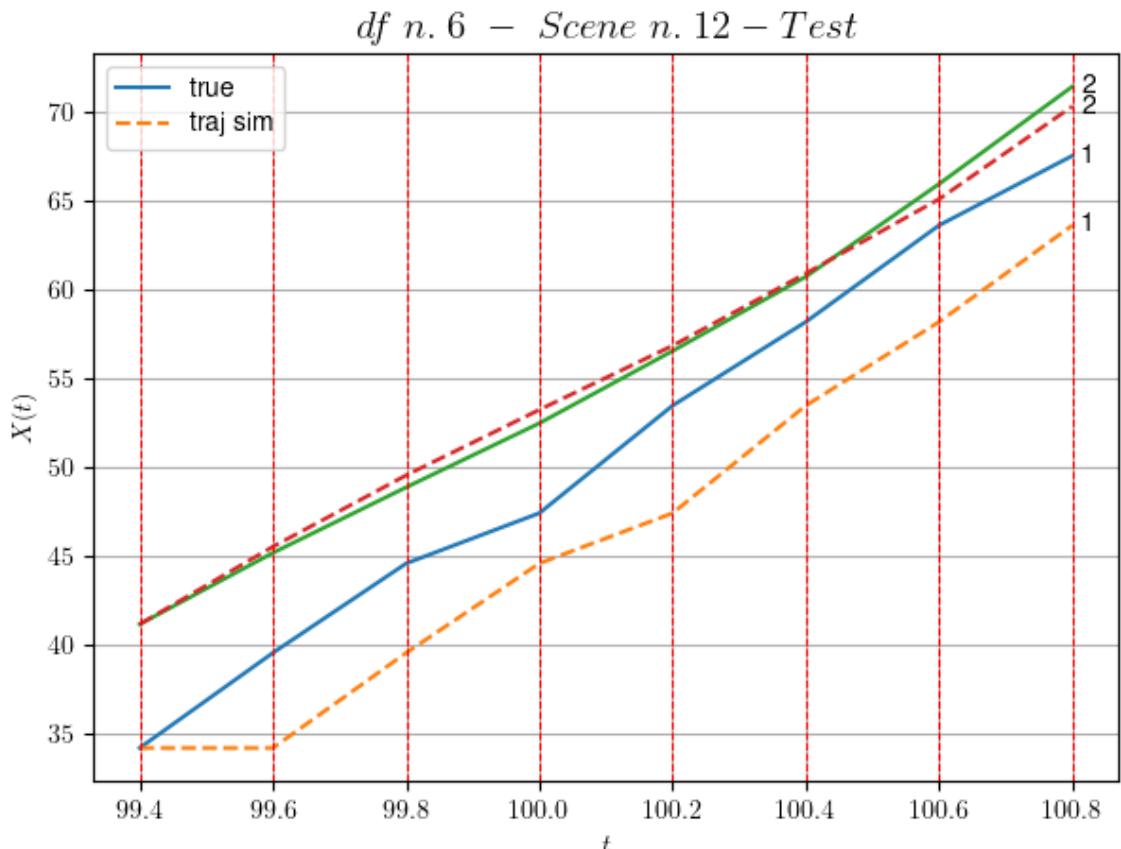


For scene 10/18:
* MSE = 7.803124493794447

DataFrame n.6. Scene n.11/18

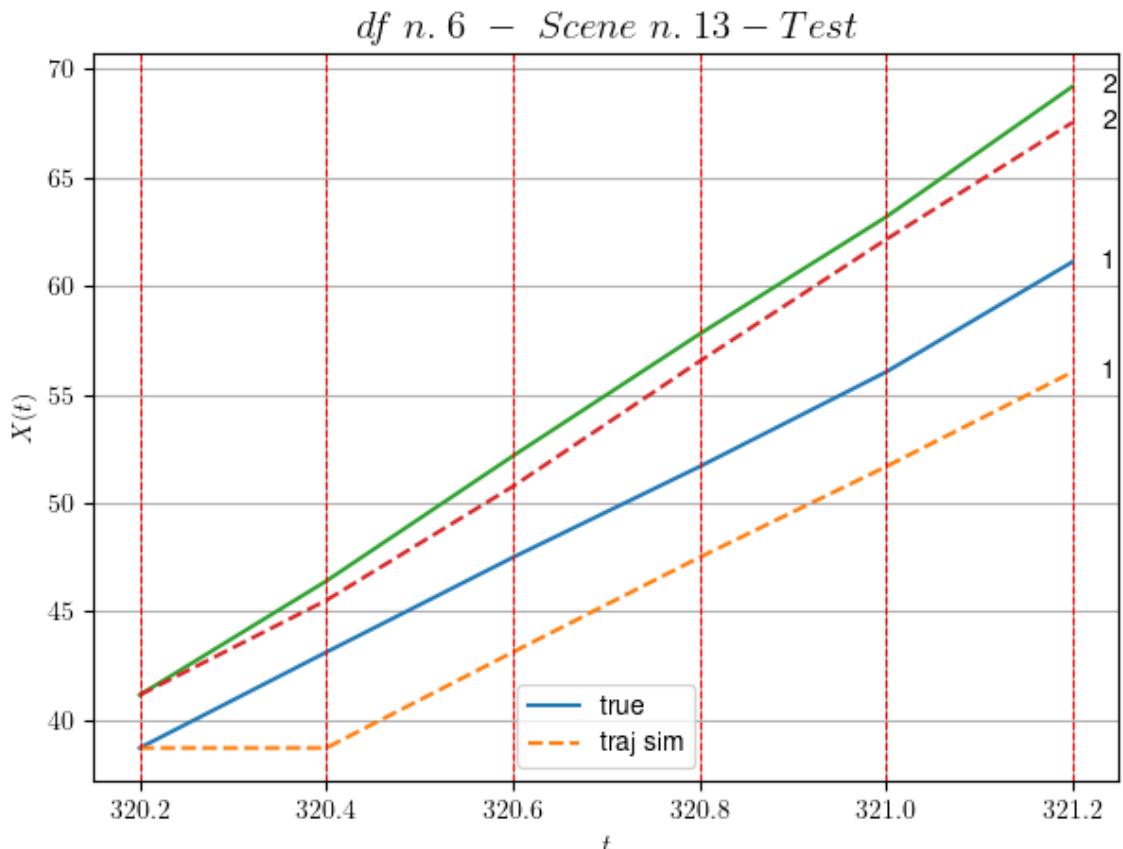


DataFrame n.6. Scene n.12/18



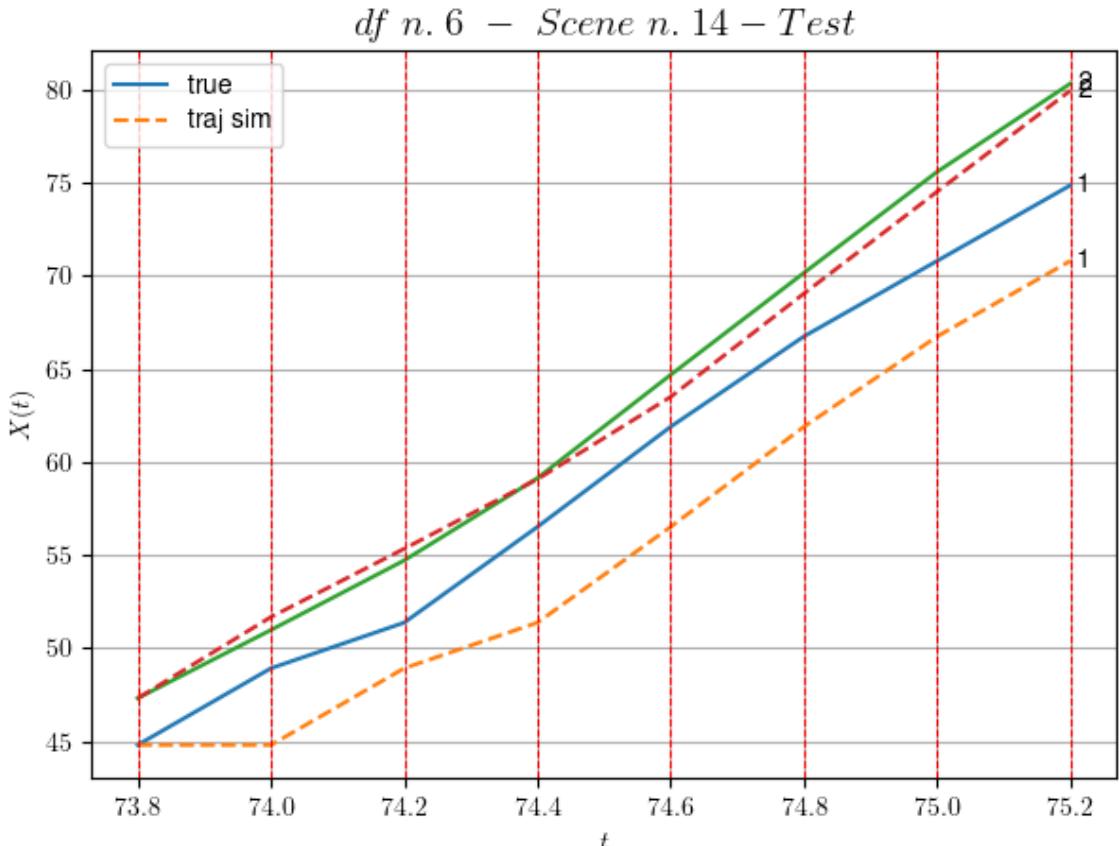
For scene 12/18:
* MSE = 10.546794222998539

DataFrame n.6. Scene n.13/18



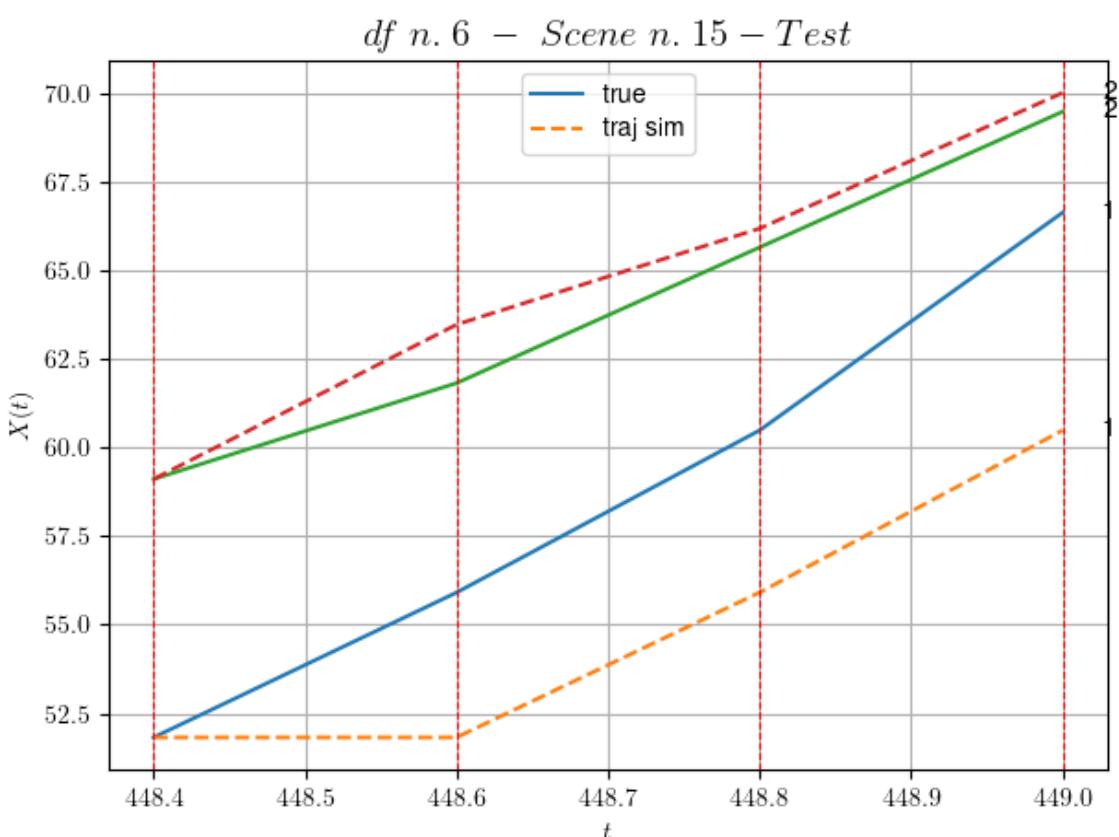
For scene 13/18:
* MSE = 9.093723985115764

DataFrame n.6. Scene n.14/18



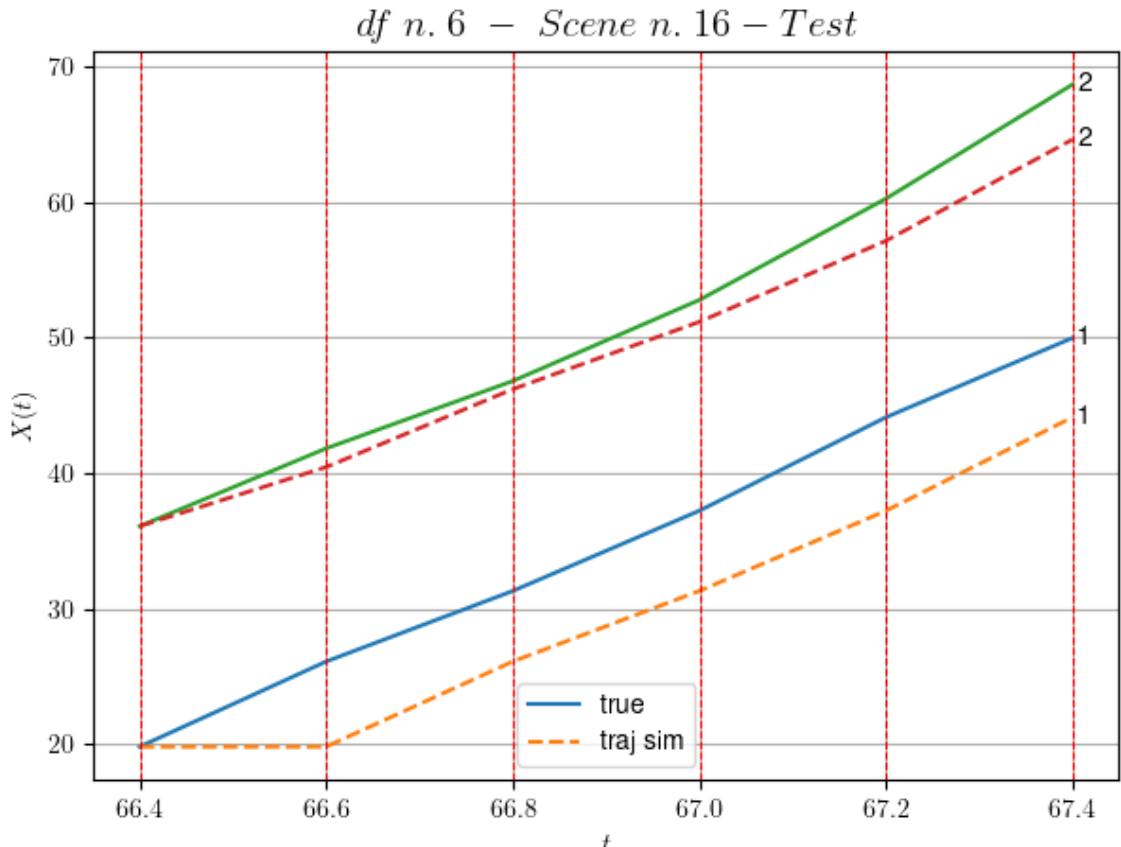
For scene 14/18:
* MSE = 8.718438589811033

DataFrame n.6. Scene n.15/18



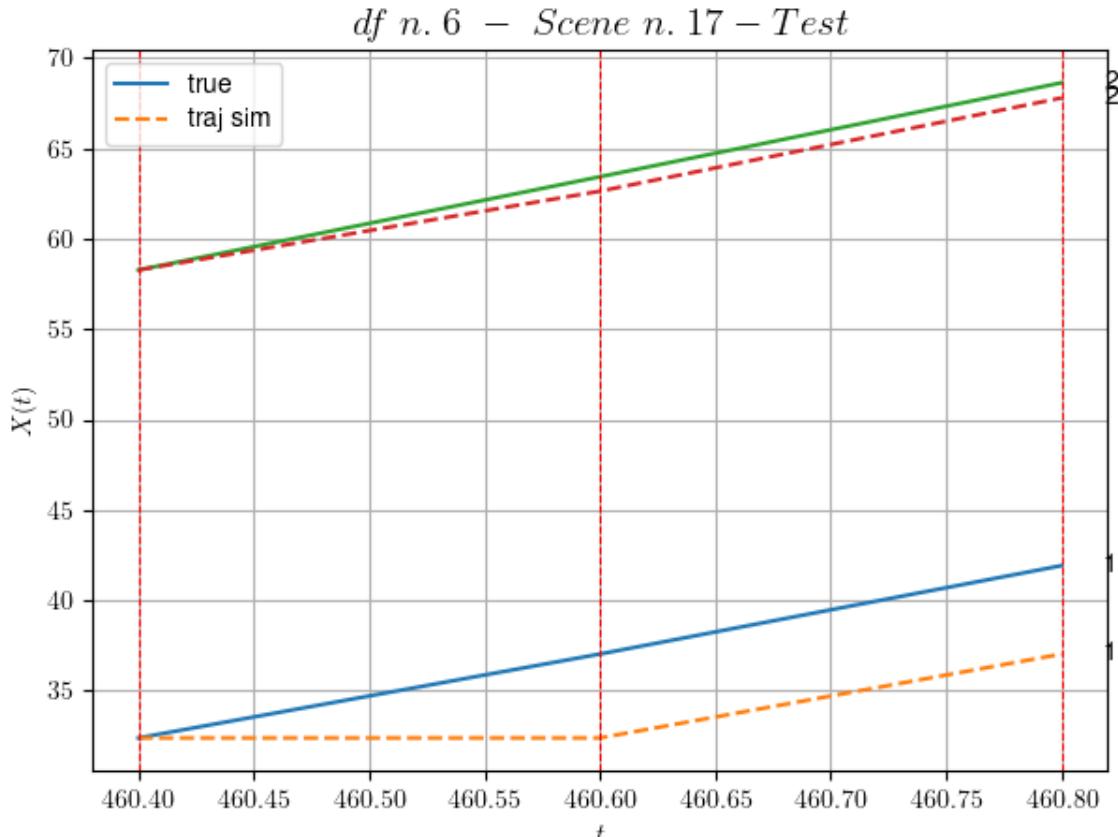
For scene 15/18:
* MSE = 9.843329186597636

DataFrame n.6. Scene n.16/18



For scene 16/18:
* MSE = 17.843339088586994

DataFrame n.6. Scene n.17/18



For scene 17/18:
* MSE = 7.806773138763854

DataFrame n. 6. Scene n. 18/18



MSE test: 8.304652653160506

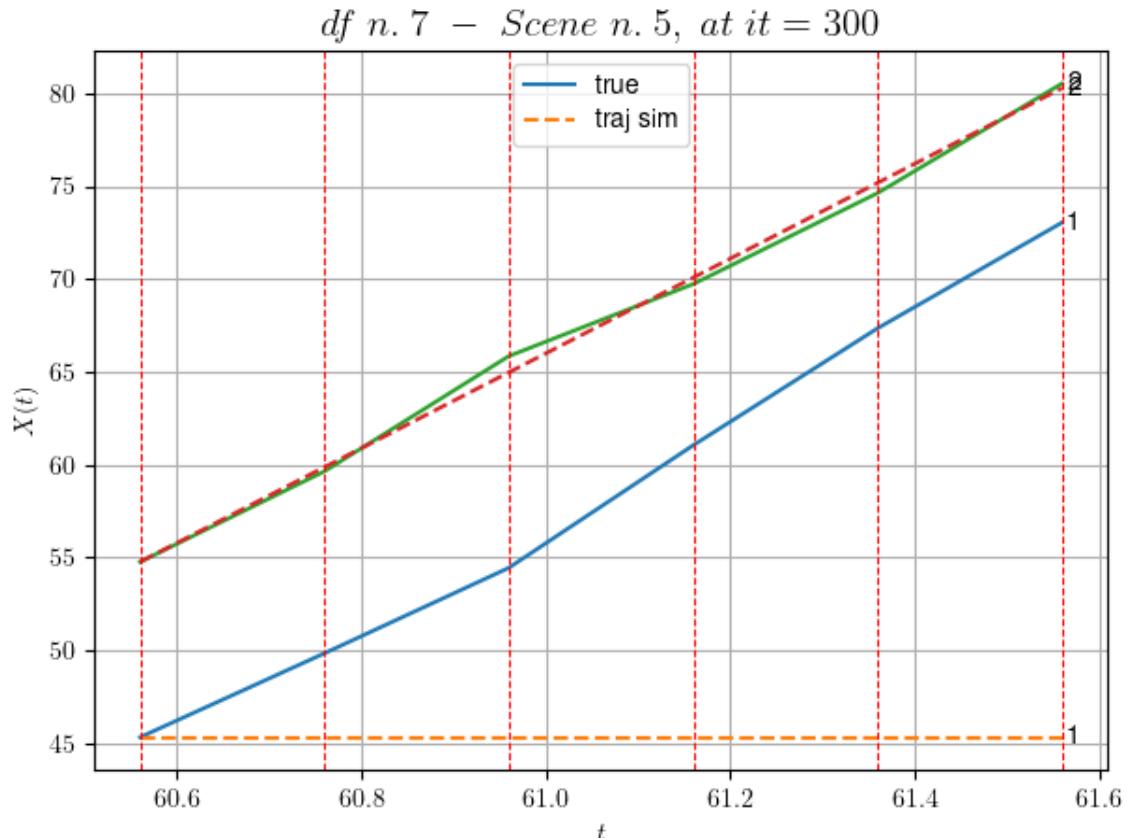
Summing up:
* MSE train: 65.19921256703435
* MSE test: 8.304652653160506

Analyzing 7/10 dfs.
In DataFrame n.7 we have 30 scenes.
To train the model we use 20 scenes, the remaining 10 to test the model.

Training step. (20 scenes)

DataFrame n.7. Scene n.1/20

We have 5 time intervals inside [60.56, 61.56]

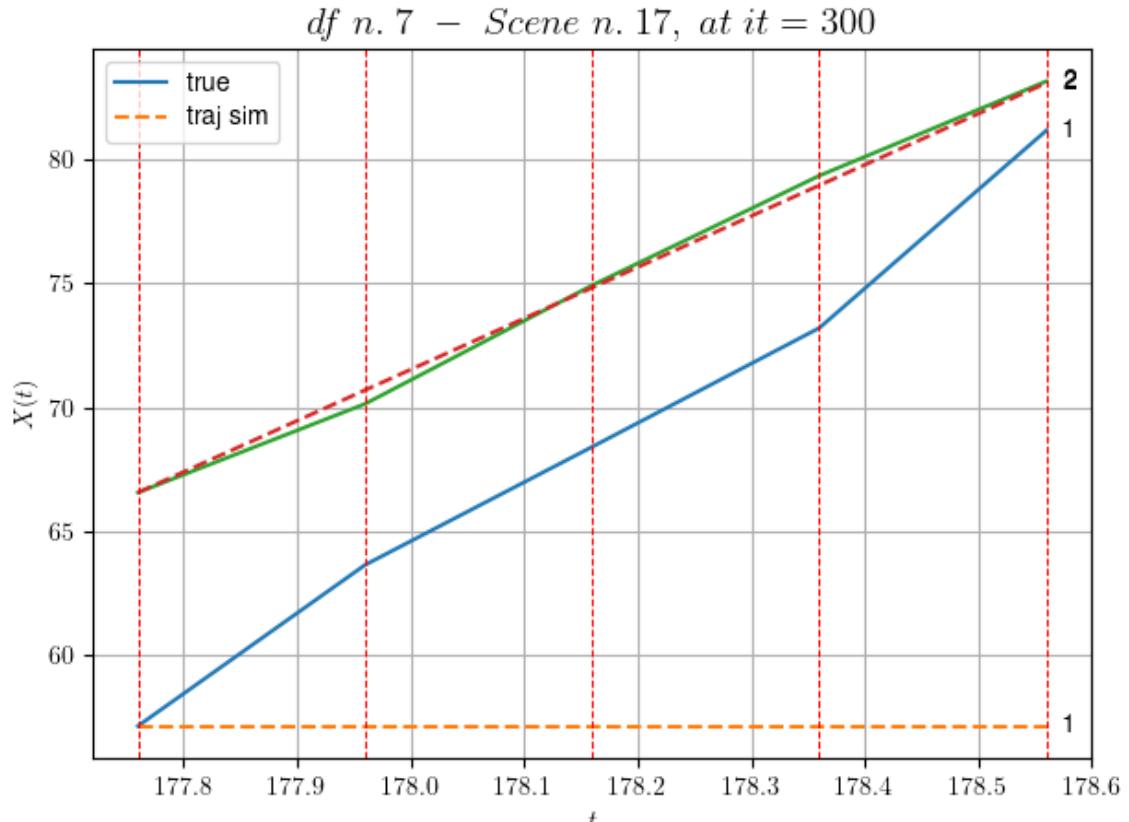


For scene 1/20:

```
* After LR finder: LR_NN=5e-05 with mse=4.687465320306859 at it=24
* v0 = 25.527221143500565
* MSE = 133.90797075249003
* iterations = 300
```

DataFrame n.7. Scene n.2/20

We have 4 time intervals inside [177.76,178.56]

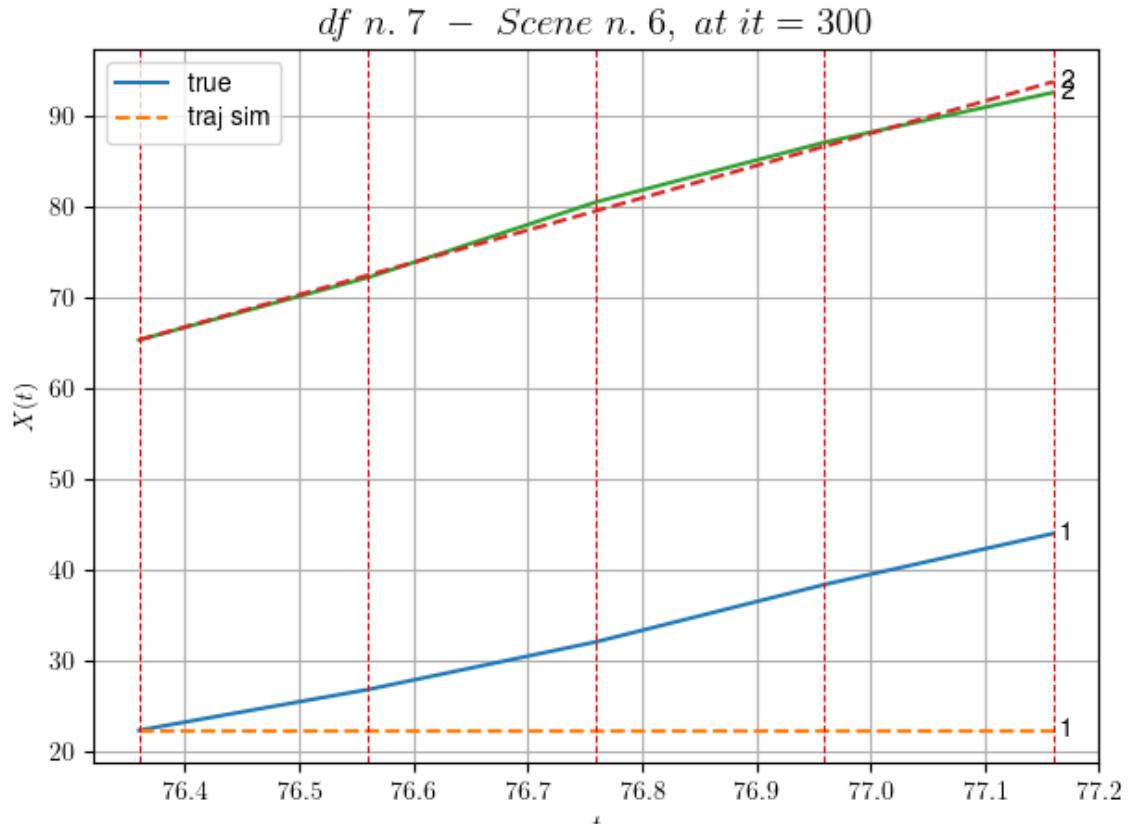


For scene 2/20:

* After LR finder: LR_NN=5e-05 with mse=10.789701406095029
at it=24
* v0 = 20.683528238846485
* MSE = 100.77486616605597
* iterations = 300

DataFrame n.7. Scene n.3/20

We have 4 time intervals inside [76.36, 77.16]

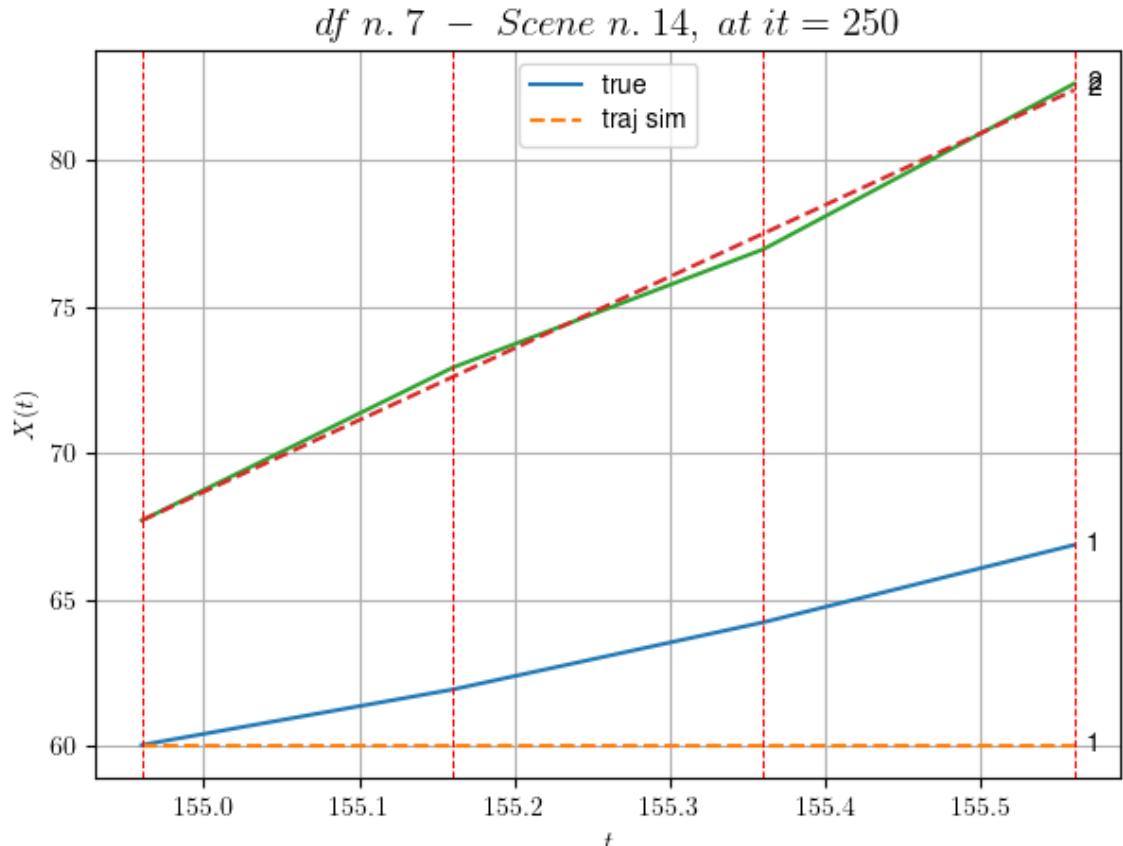


For scene 3/20:

- * After LR finder: LR_NN=5e-05 with mse=3.6450904028449314
- at it=24
 - * v0 = 35.53676661235236
 - * MSE = 84.42608418592441
 - * iterations = 300

DataFrame n.7. Scene n.4/20

We have 3 time intervals inside [154.96,155.56]

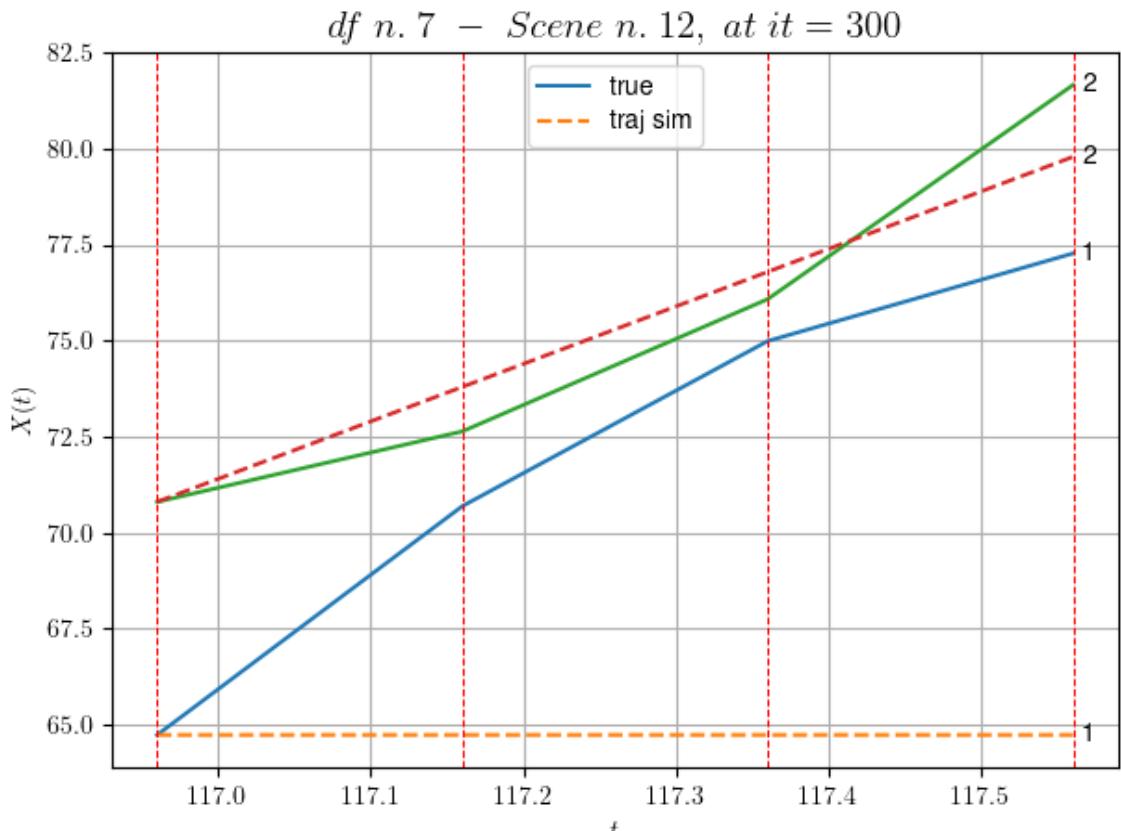


For scene 4/20:

* After LR finder: LR_NN=0.001 with mse=2.198090097878668 at it=24
* $v_0 = 24.524894225750582$
* MSE = 8.547902701463196
* iterations = 250

DataFrame n.7. Scene n.5/20

We have 3 time intervals inside [116.96,117.56]

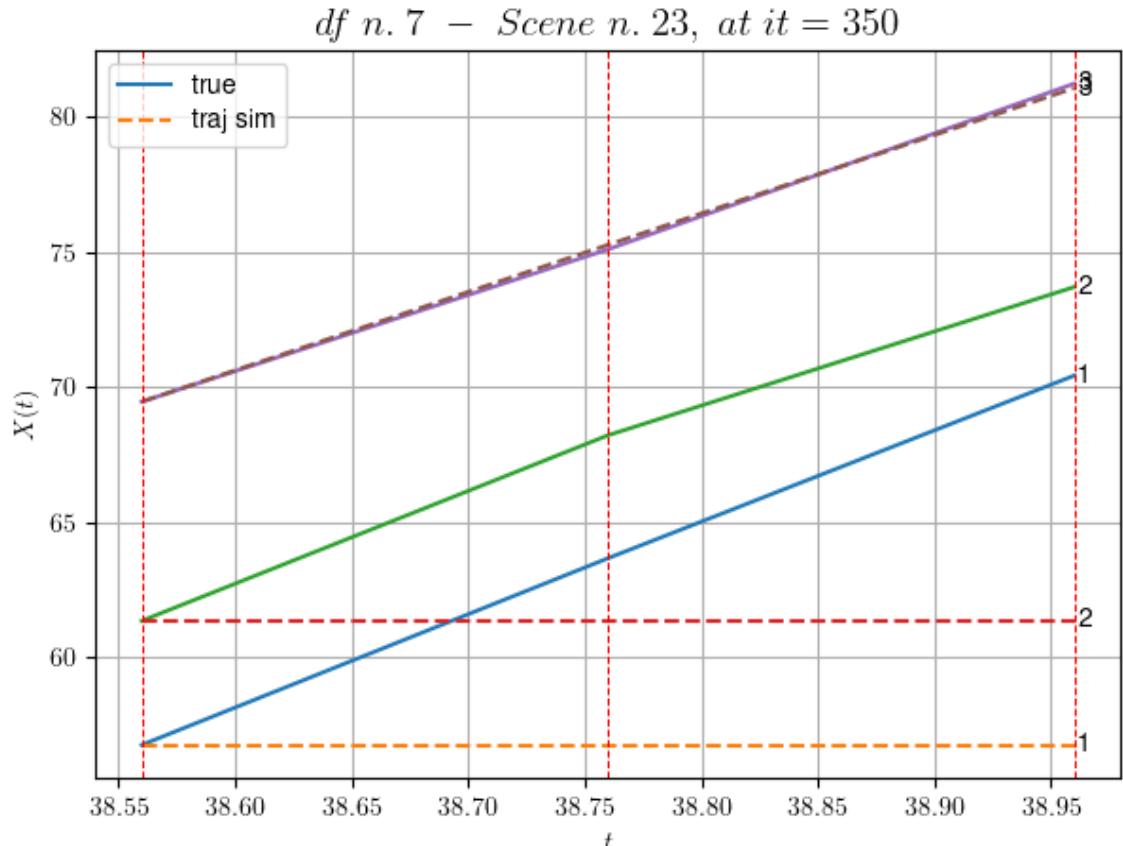


For scene 5/20:

* After LR finder: $LR_{NN}=0.001$ with $mse=14.652412049104996$
at it=24
* $v_0 = 14.9816440054728$
* $MSE = 37.85912320216085$
* iterations = 300

DataFrame n.7. Scene n.6/20

We have 2 time intervals inside [38.56,38.96]

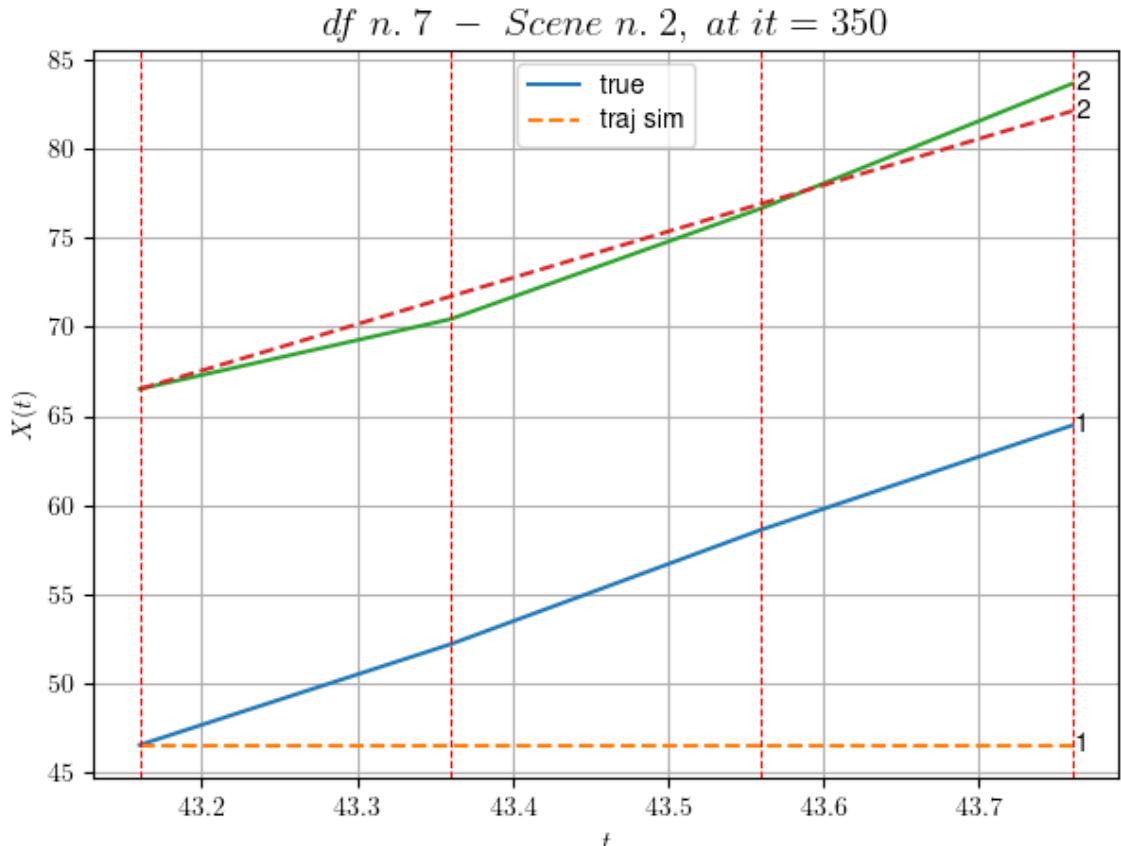


For scene 6/20:

* After LR finder: LR_NN=0.0005 with mse=3.2526989987291652
at it=24
* v0 = 28.990017888098798
* MSE = 48.17007066226208
* iterations = 350

DataFrame n.7. Scene n.7/20

We have 3 time intervals inside [43.16,43.76]

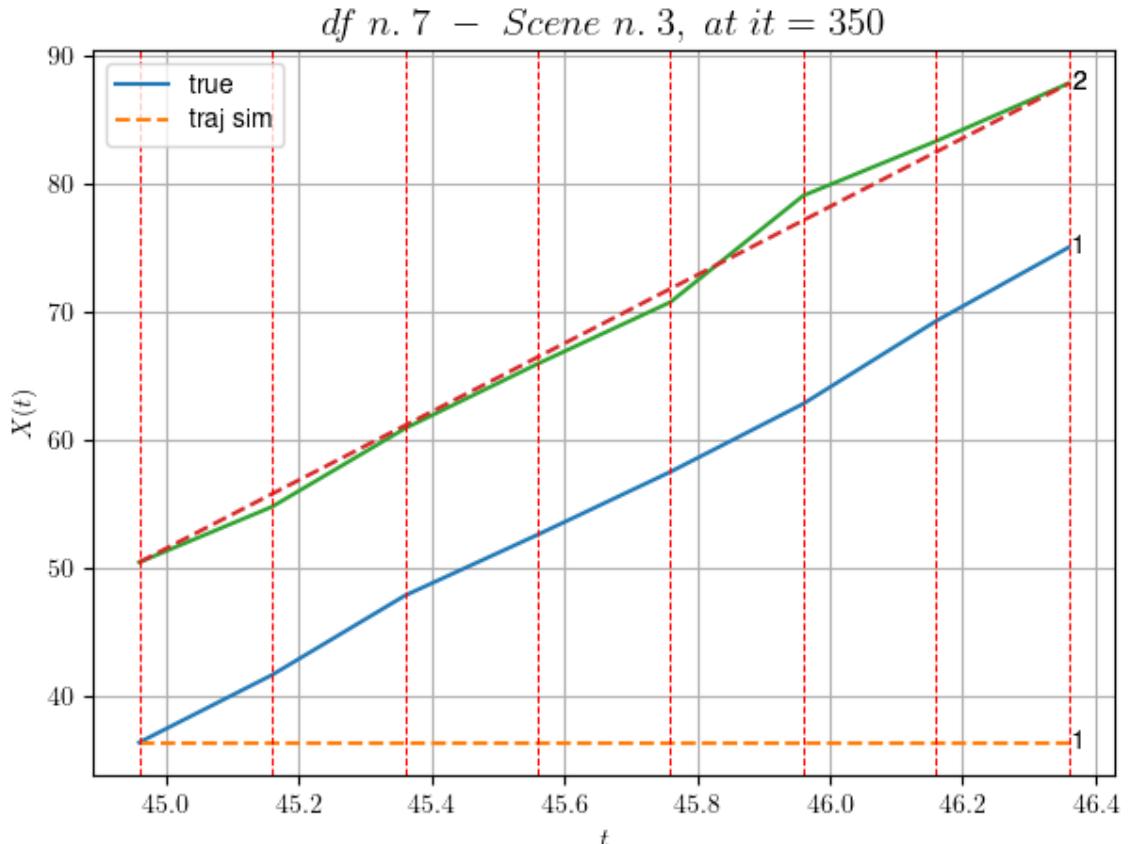


For scene 7/20:

* After LR finder: LR_NN=0.0005 with mse=1.2084926639833535
at it=24
* $v_0 = 25.959463637944094$
* MSE = 62.6623995640536
* iterations = 350

DataFrame n.7. Scene n.8/20

We have 7 time intervals inside [44.96, 46.36]

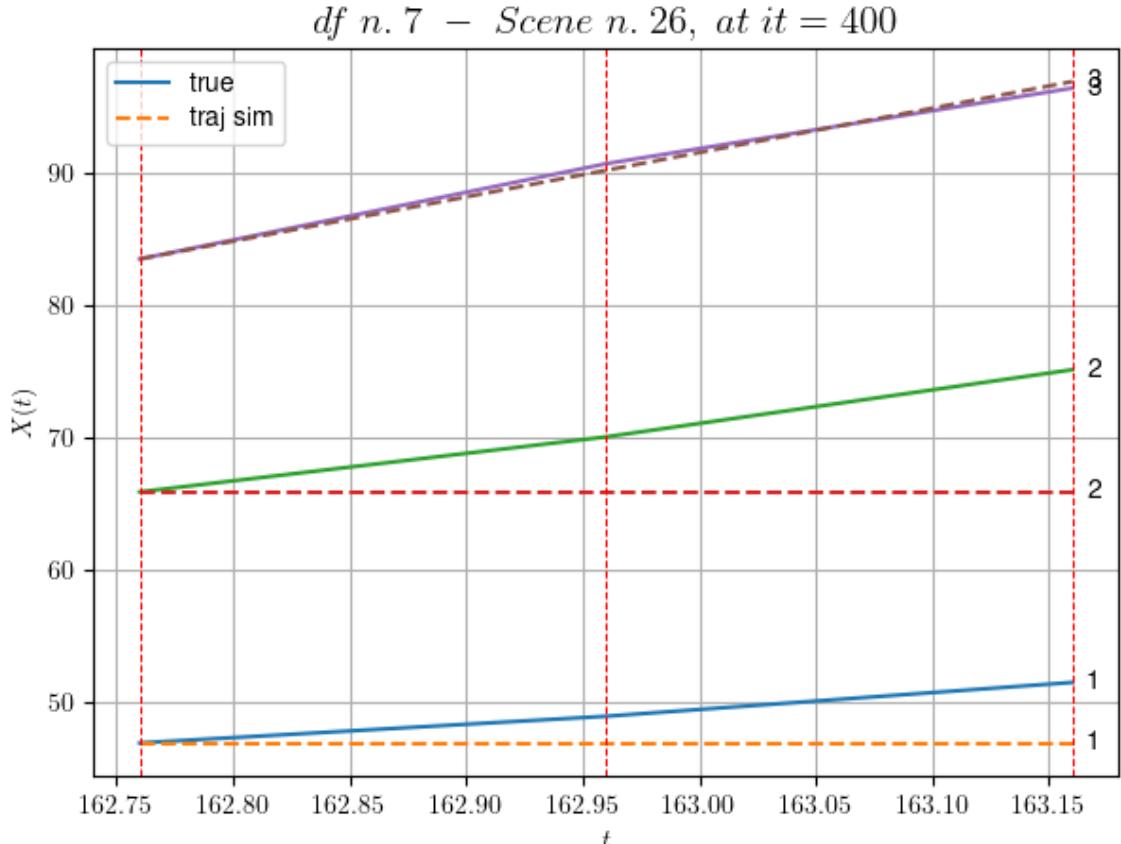


For scene 8/20:

* After LR finder: LR_NN=0.0001 with mse=3.741599248581762
at it=24
* $v_0 = 26.657757092087287$
* MSE = 258.6256932859581
* iterations = 350

DataFrame n.7. Scene n.9/20

We have 2 time intervals inside [162.76,163.16]

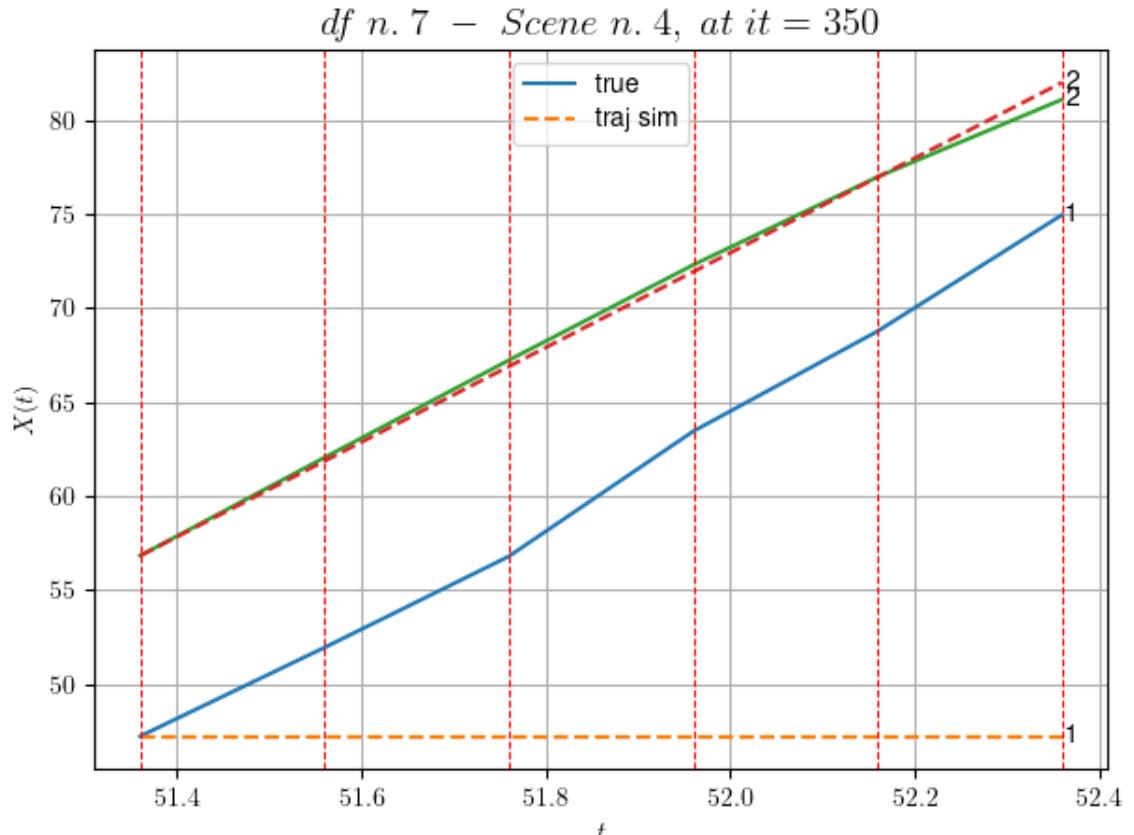


For scene 9/20:

* After LR finder: LR_NN=5e-05 with mse=1.9368161685550283
at it=24
* v0 = 33.514550083286494
* MSE = 14.206050229099672
* iterations = 400

DataFrame n.7. Scene n.10/20

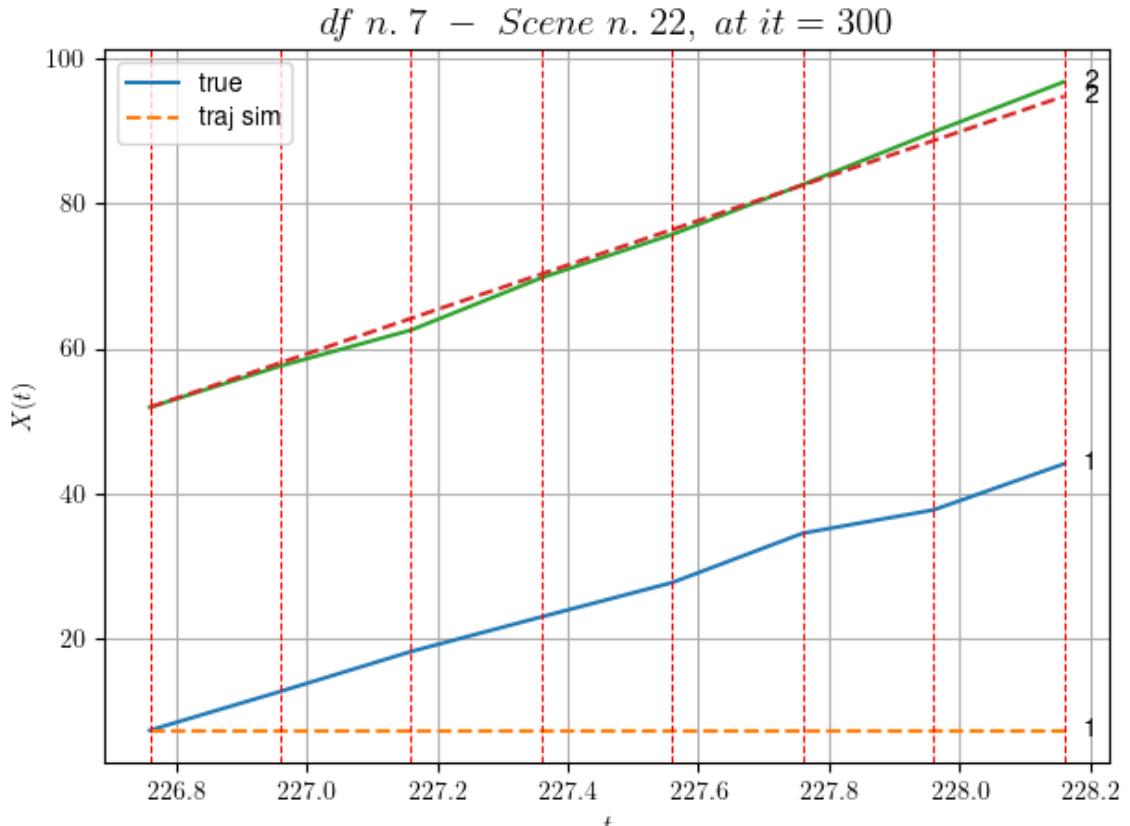
We have 5 time intervals inside [51.36,52.36]



For scene 10/20:
* After LR finder: LR_NN=0.0001 with mse=5.500288122048478
at it=24
* v0 = 25.158740688471877
* MSE = 134.13953412527155
* iterations = 350

DataFrame n.7. Scene n.11/20

We have 7 time intervals inside [226.76,228.16]

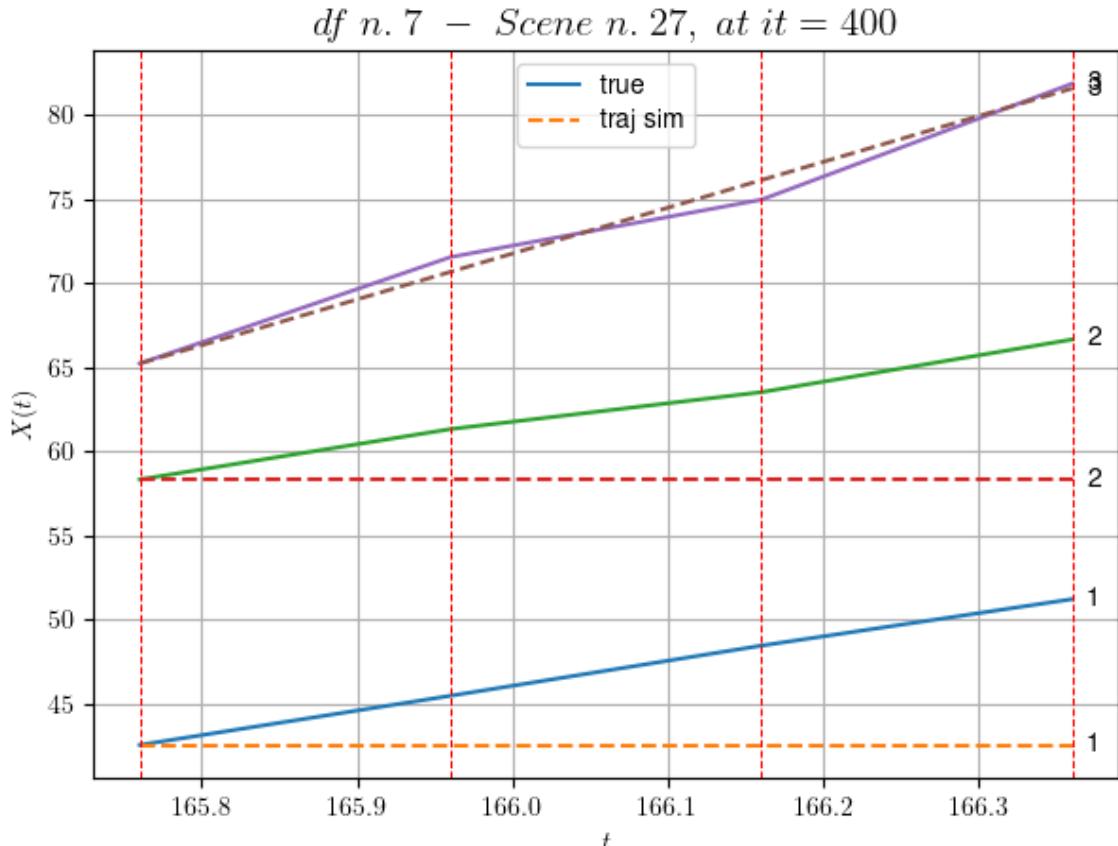


For scene 11/20:

- * After LR finder: $LR_NN=1e-05$ with $mse=1.2457485944378057$
- at it=24
 - * $v_0 = 30.69836117197959$
 - * MSE = 239.93927758355338
 - * iterations = 300

DataFrame n.7. Scene n.12/20

We have 3 time intervals inside [165.76,166.36]

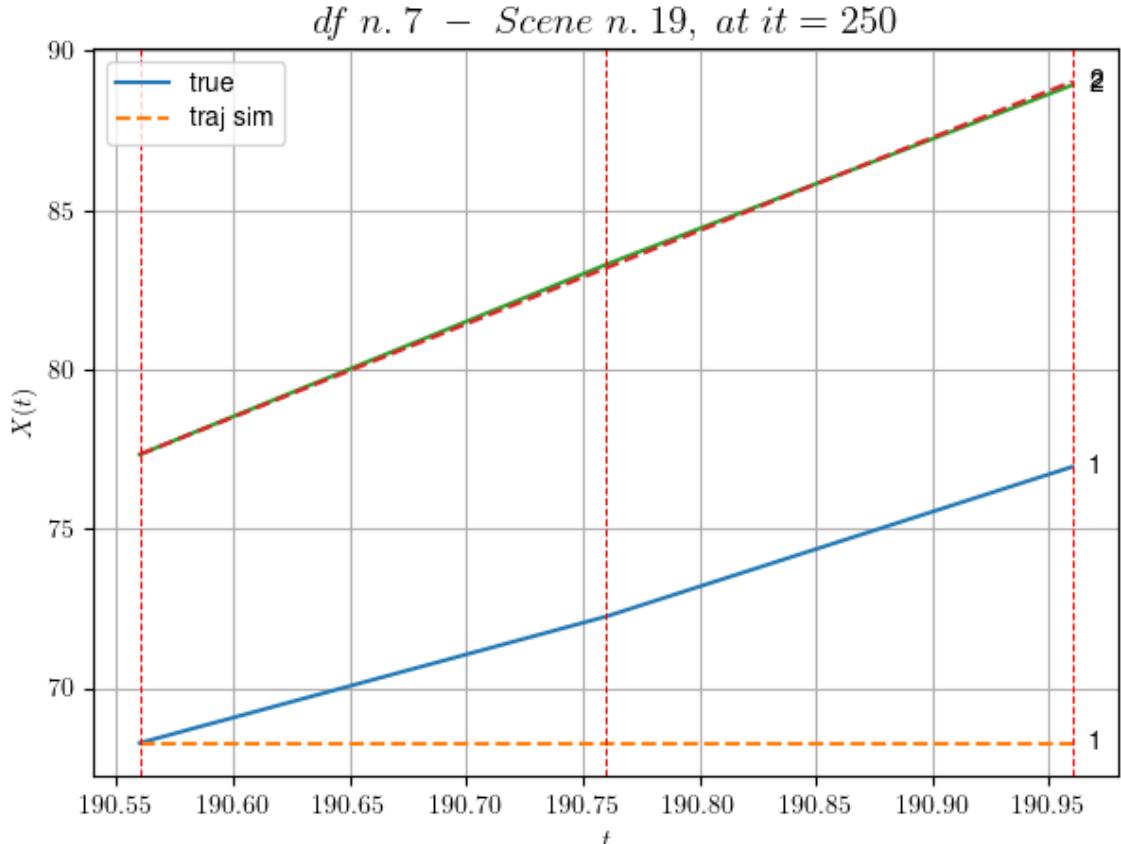


For scene 12/20:

* After LR finder: LR_NN=0.0005 with mse=1.437968032663796
at it=24
* v0 = 27.262213356187985
* MSE = 18.835659811042063
* iterations = 400

DataFrame n.7. Scene n.13/20

We have 2 time intervals inside [190.56,190.96]

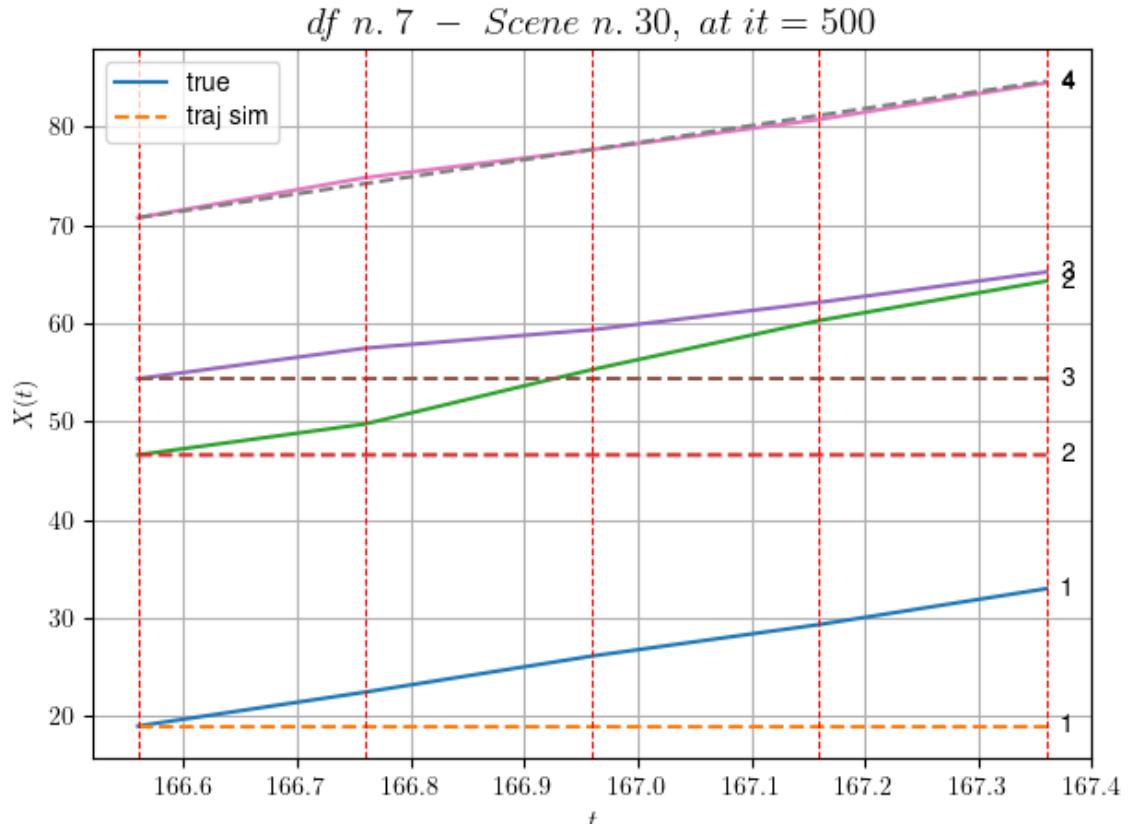


For scene 13/20:

* After LR finder: LR_NN=0.0005 with mse=0.0285229469705292
13 at it=24
* v0 = 29.283628125142897
* MSE = 15.172852013851172
* iterations = 250

DataFrame n.7. Scene n.14/20

We have 4 time intervals inside [166.56,167.36]

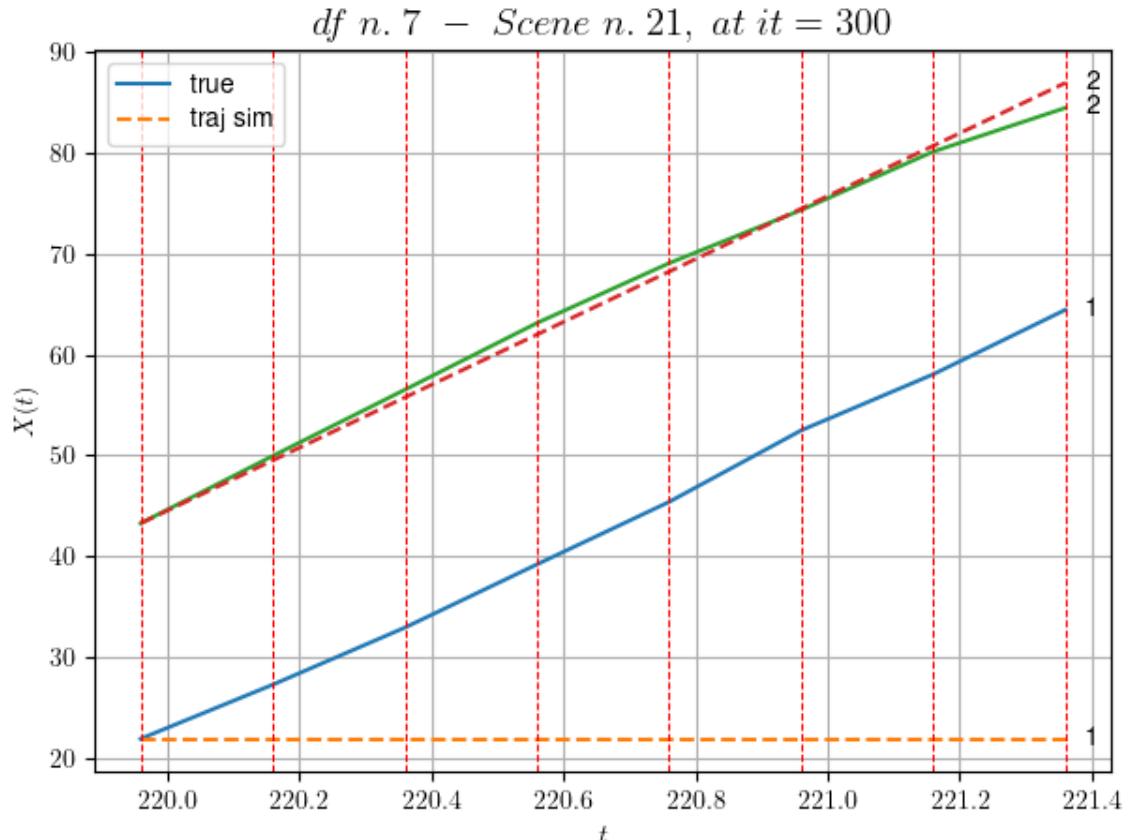


For scene 14/20:

* After LR finder: LR_NN=0.001 with mse=27.457015612188883
at it=24
* v0 = 17.36863596906619
* MSE = 58.238899009461704
* iterations = 500

DataFrame n.7. Scene n.15/20

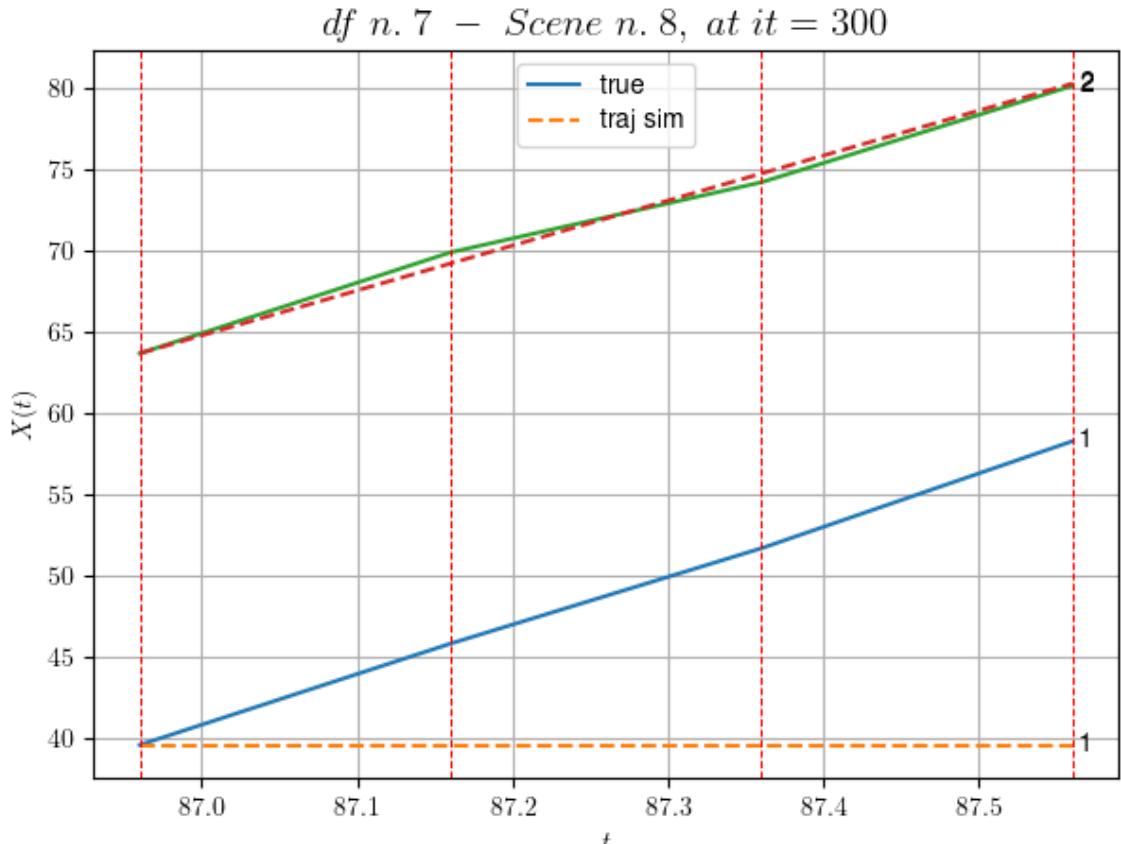
We have 7 time intervals inside [219.96,221.36]



For scene 15/20:
* After LR finder: LR_NN=5e-05 with mse=0.9060781778077328
at it=24
* v0 = 31.227007314828043
* MSE = 316.94023016553547
* iterations = 300

DataFrame n.7. Scene n.16/20

We have 3 time intervals inside [86.96,87.56]

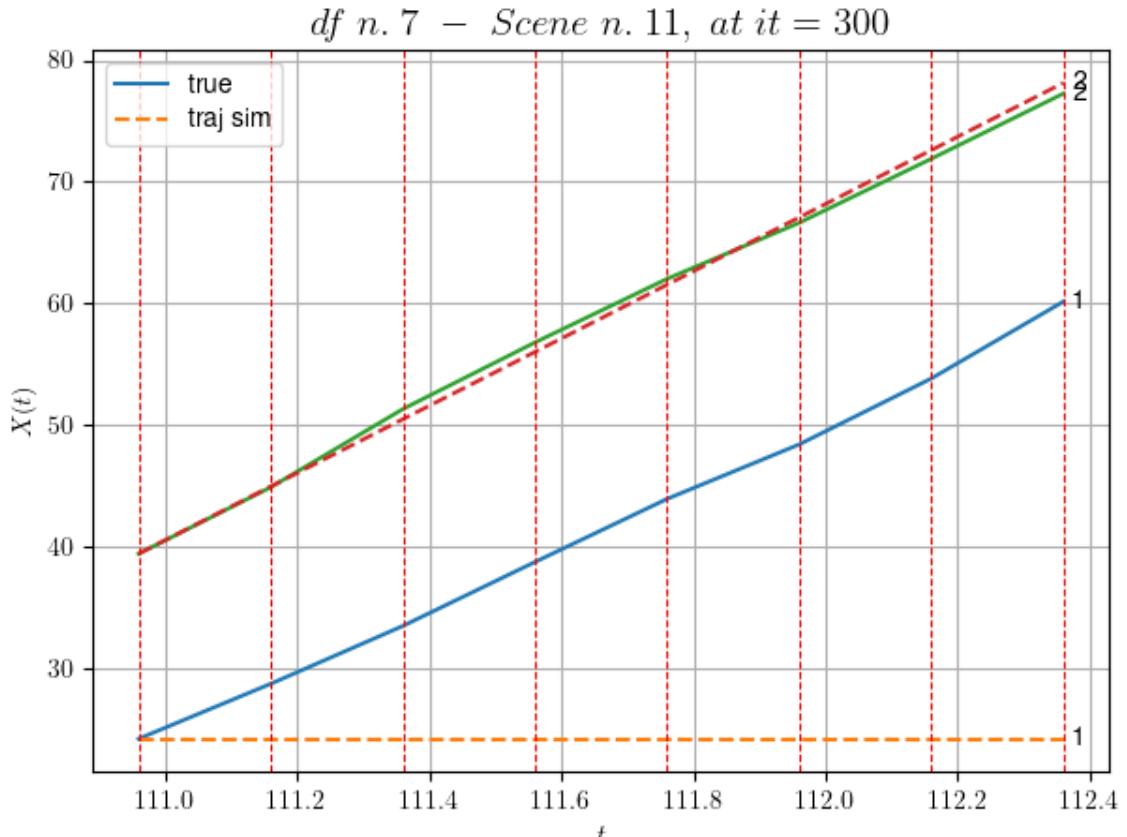


For scene 16/20:

* After LR finder: LR_NN=5e-05 with mse=0.6434574235771395
at it=24
* v0 = 27.63329530401147
* MSE = 66.75074106014883
* iterations = 300

DataFrame n.7. Scene n.17/20

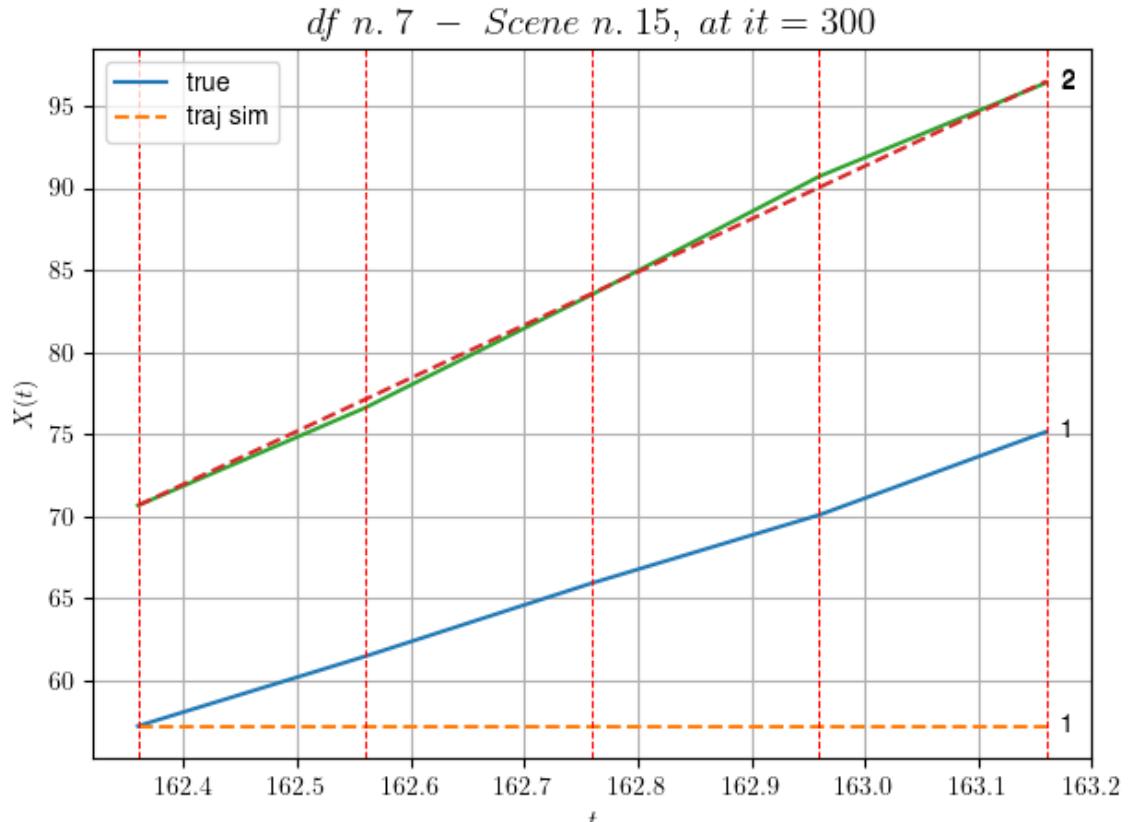
We have 7 time intervals inside [110.96,112.36]



For scene 17/20:
* After LR finder: LR_NN=5e-05 with mse=2.6249239784491105
at it=24
* $v_0 = 27.67625731506995$
* MSE = 216.93360967639572
* iterations = 300

DataFrame n.7. Scene n.18/20

We have 4 time intervals inside [162.36, 163.16]

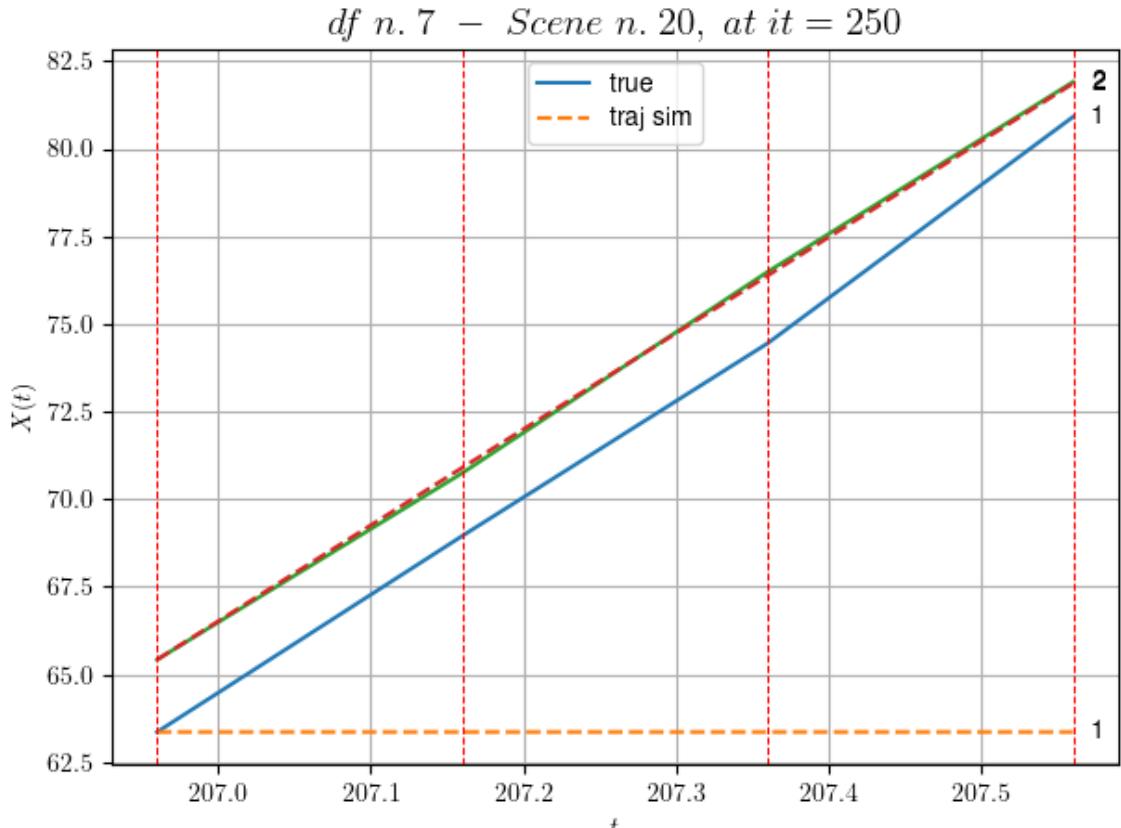


For scene 18/20:

- * After LR finder: $LR_NN=0.001$ with $mse=0.892678357075178$ at $it=24$
- * $v\theta = 32.32378718324446$
- * $MSE = 58.23120873684453$
- * iterations = 300

DataFrame n.7. Scene n.19/20

We have 3 time intervals inside $[206.96, 207.56]$

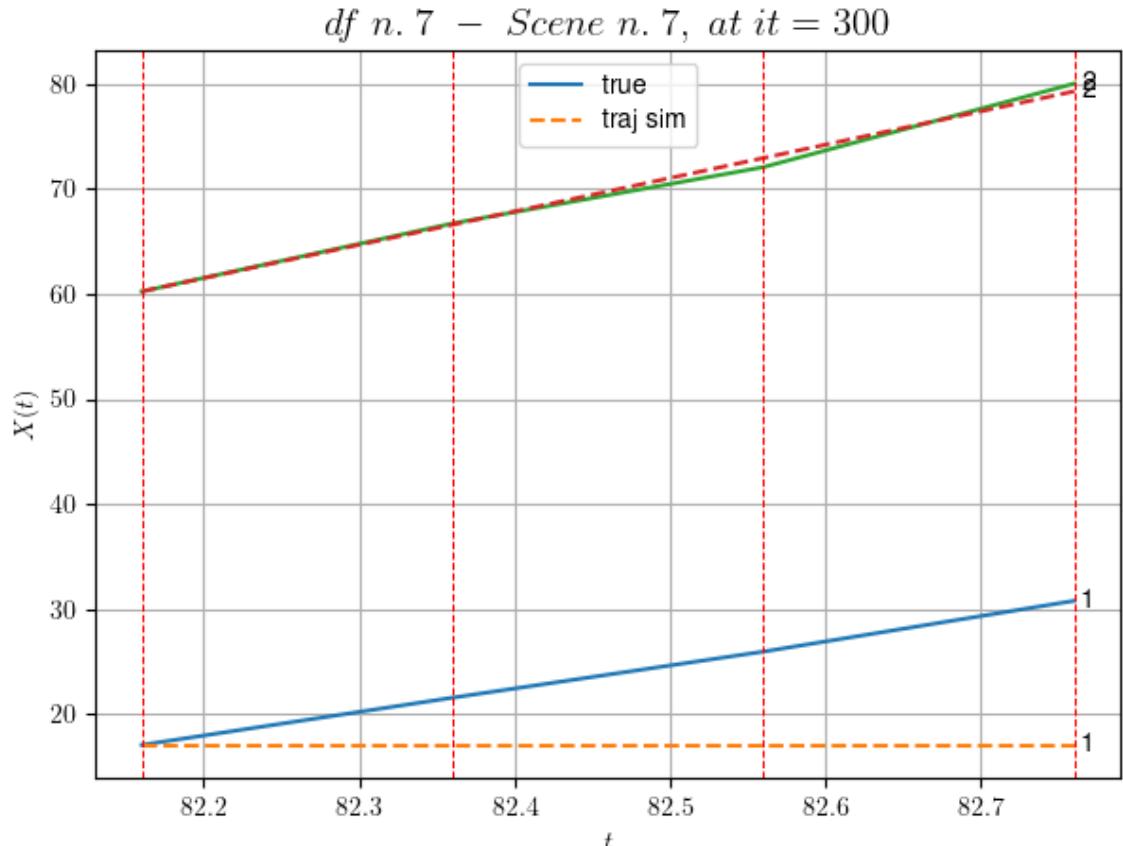


For scene 19/20:

* After LR finder: LR_NN=0.0005 with mse=0.5073425385299113
at it=24
* v0 = 27.399263722501612
* MSE = 57.820609531878105
* iterations = 250

DataFrame n.7. Scene n.20/20

We have 3 time intervals inside [82.16,82.76]



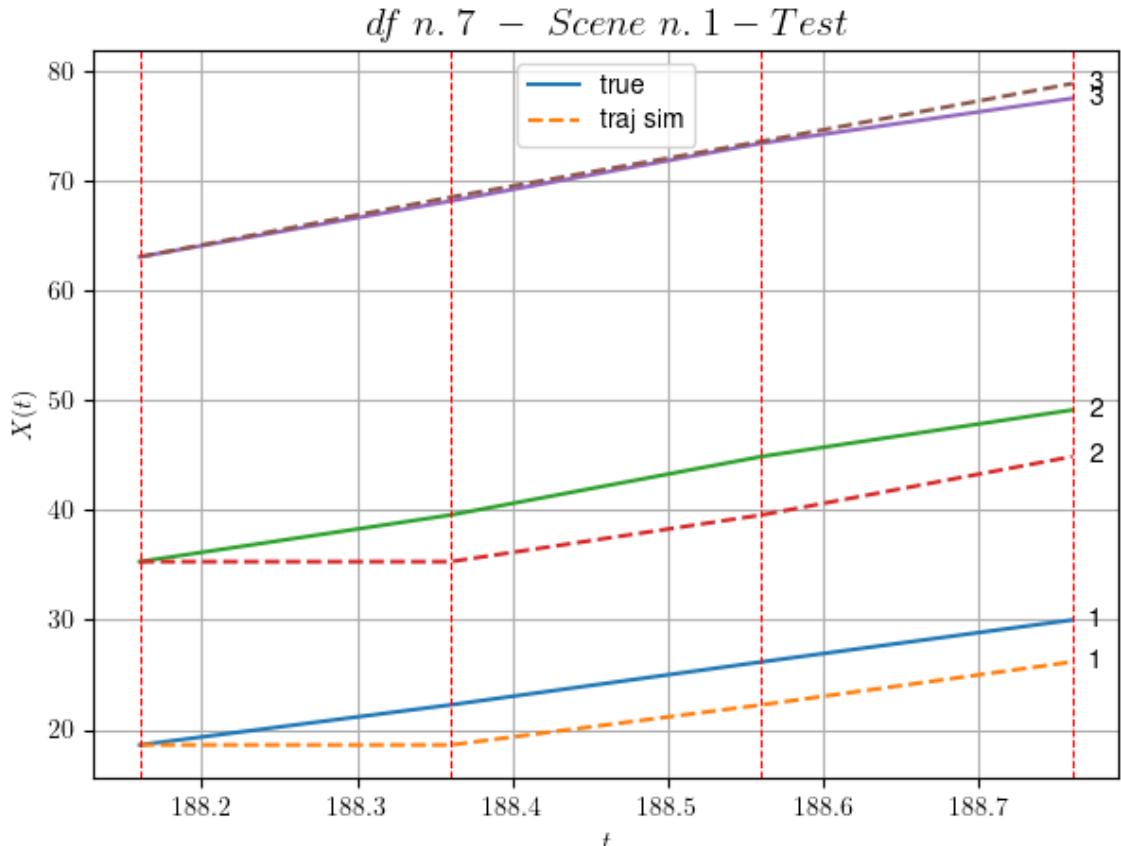
For scene 20/20:

* After LR finder: LR_NN=5e-05 with mse=0.43384669816839316
at it=24
* v0 = 31.74543064207497
* MSE = 36.07447077203947
* iterations = 300

MSE train: 98.41286266177448

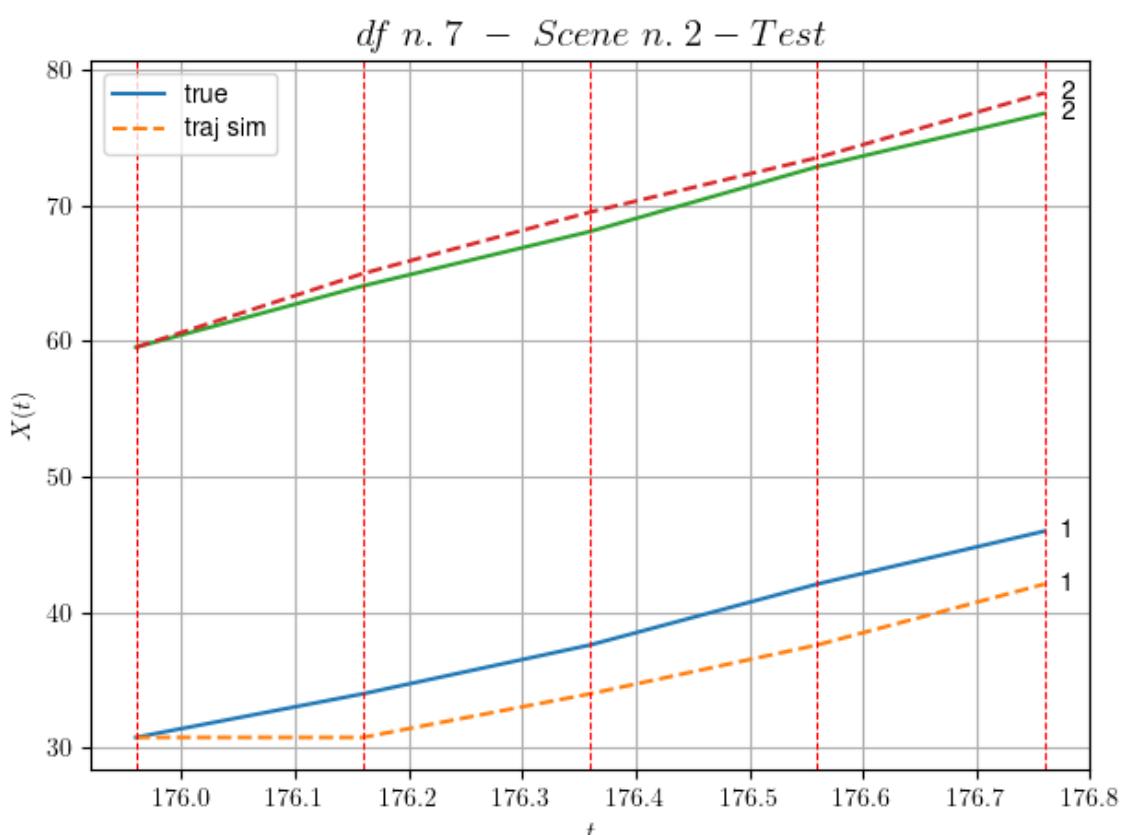
Testing step. (10 scenes)

DataFrame n.7. Scene n.1/10



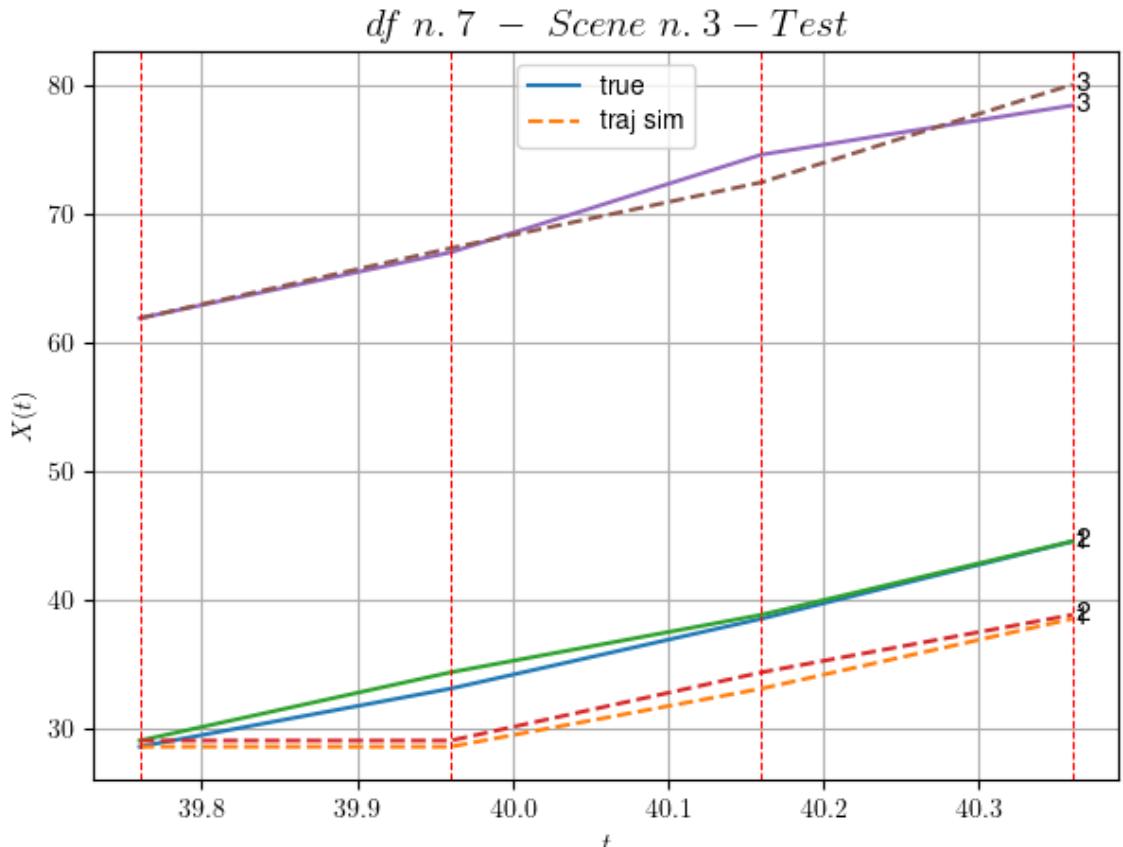
For scene 1/10:
* MSE = 9.144974674505184

DataFrame n.7. Scene n.2/10



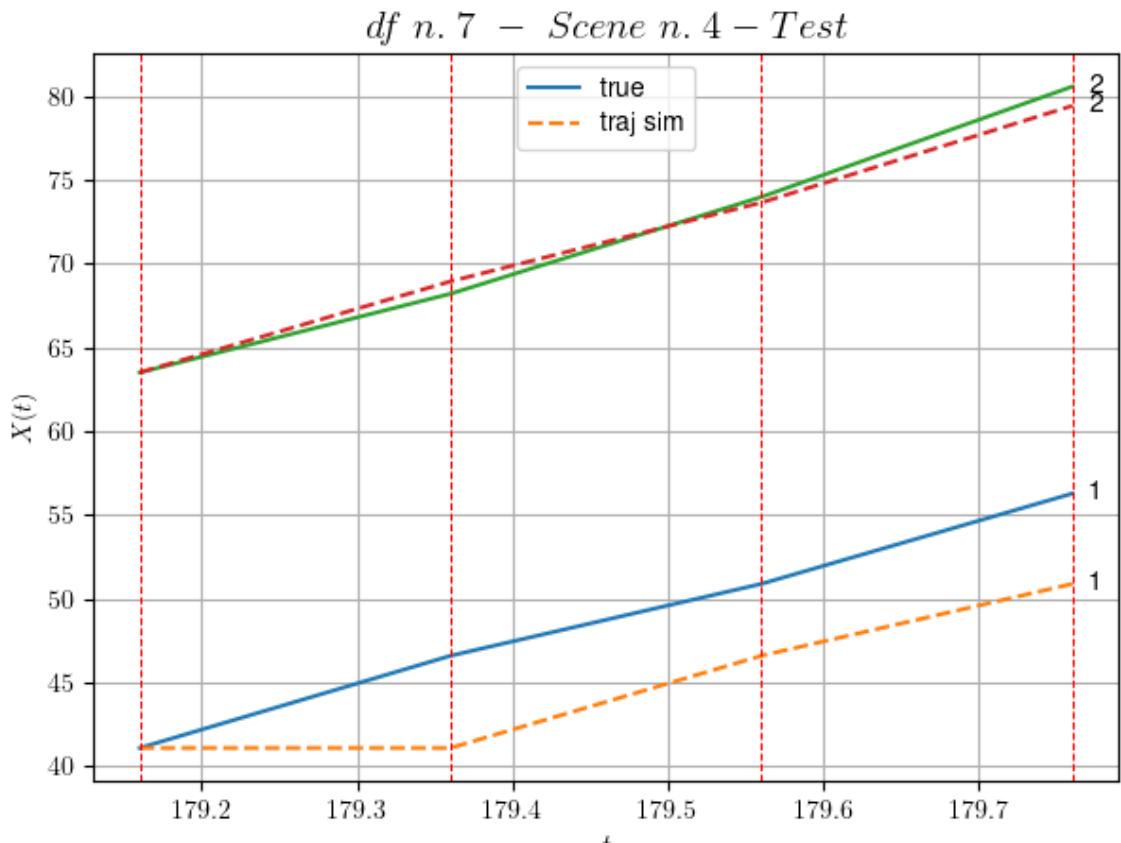
For scene 2/10:
* MSE = 6.429151376574889

DataFrame n.7. Scene n.3/10



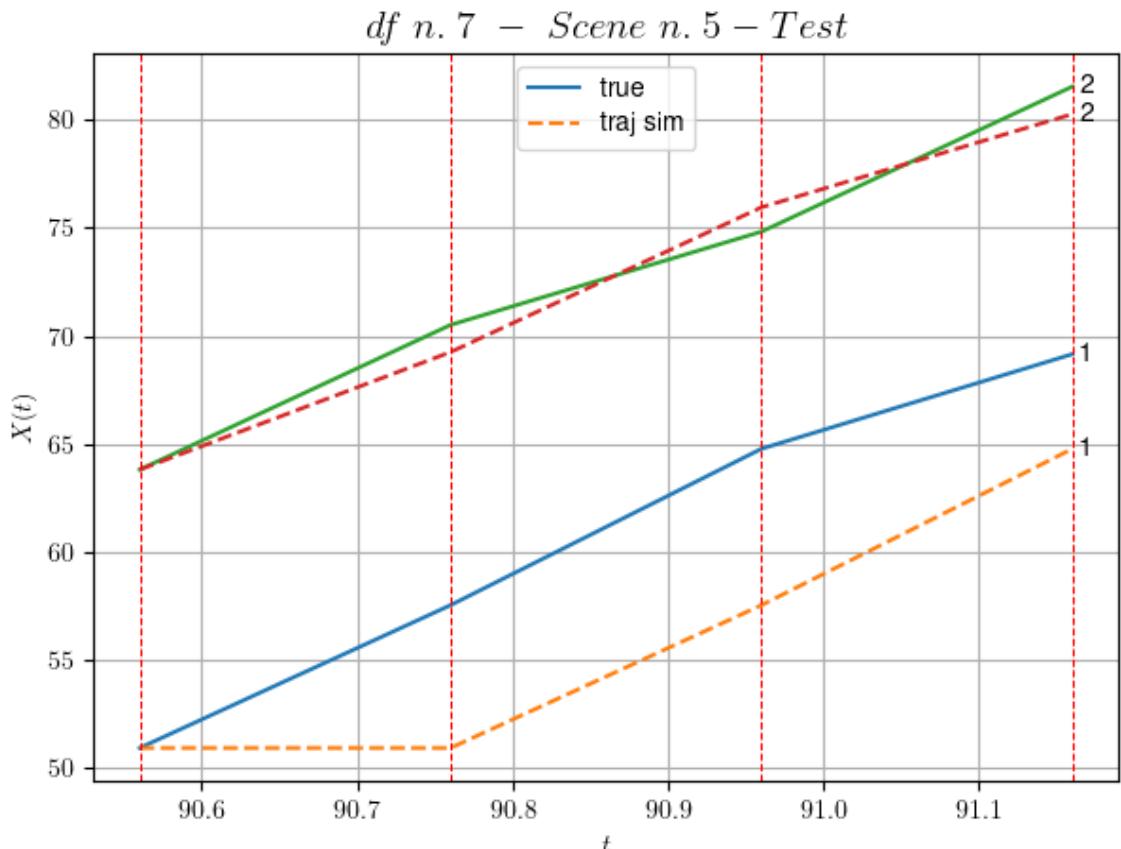
For scene 3/10:
* MSE = 14.491713771596771

DataFrame n.7. Scene n.4/10



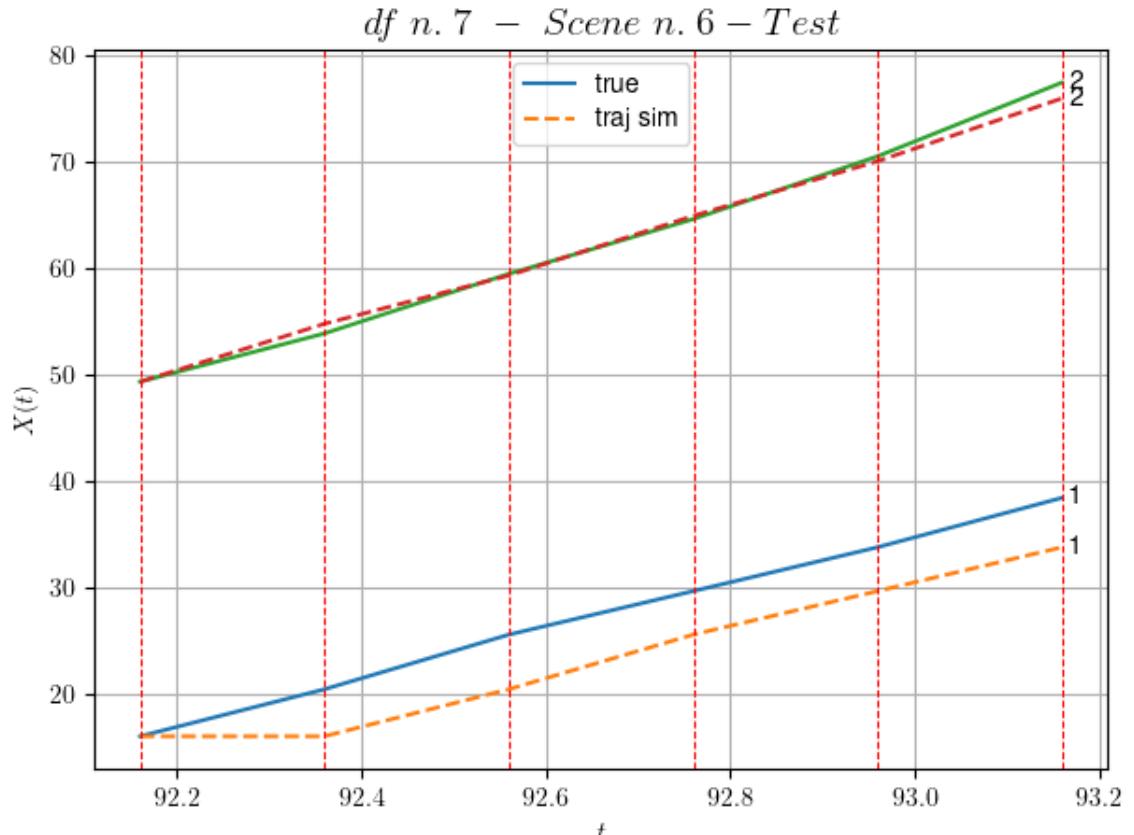
For scene 4/10:
* MSE = 9.97341447816449

DataFrame n.7. Scene n.5/10



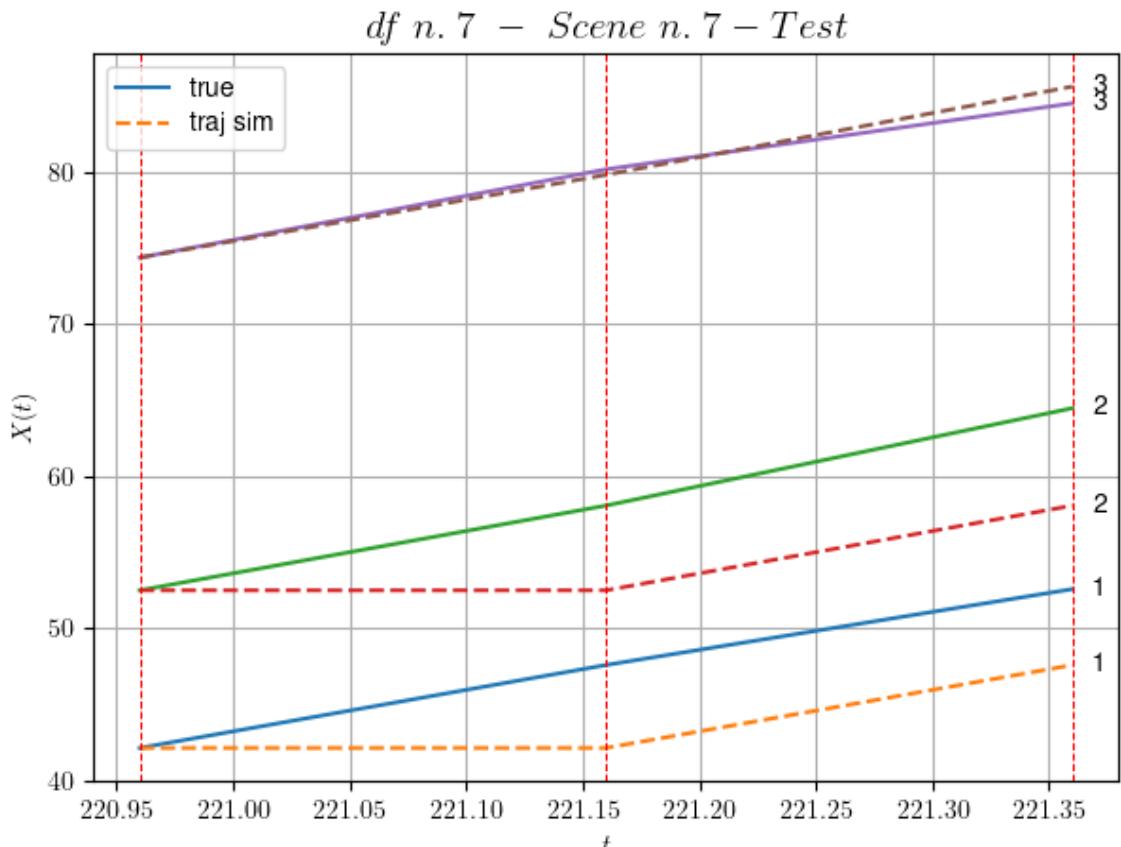
For scene 5/10:
* MSE = 14.965026500133833

DataFrame n.7. Scene n.6/10



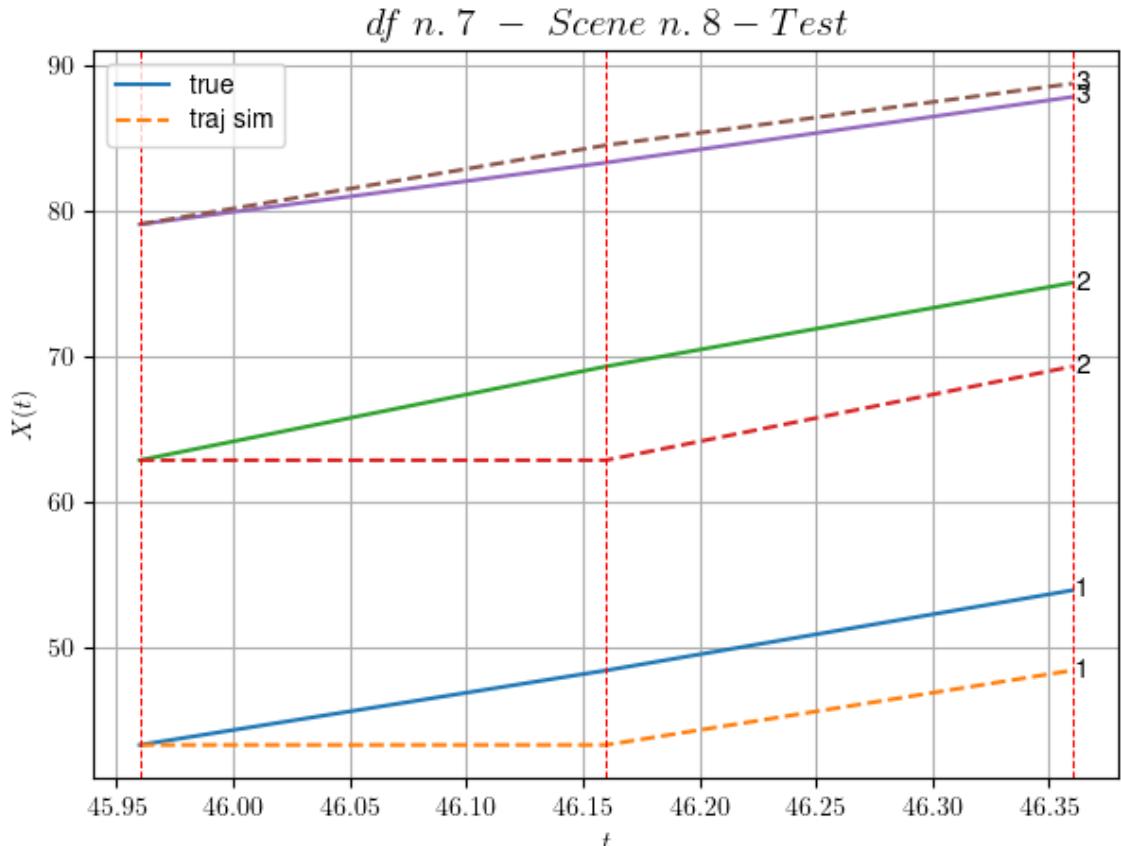
For scene 6/10:
* MSE = 8.699875821735237

DataFrame n.7. Scene n.7/10



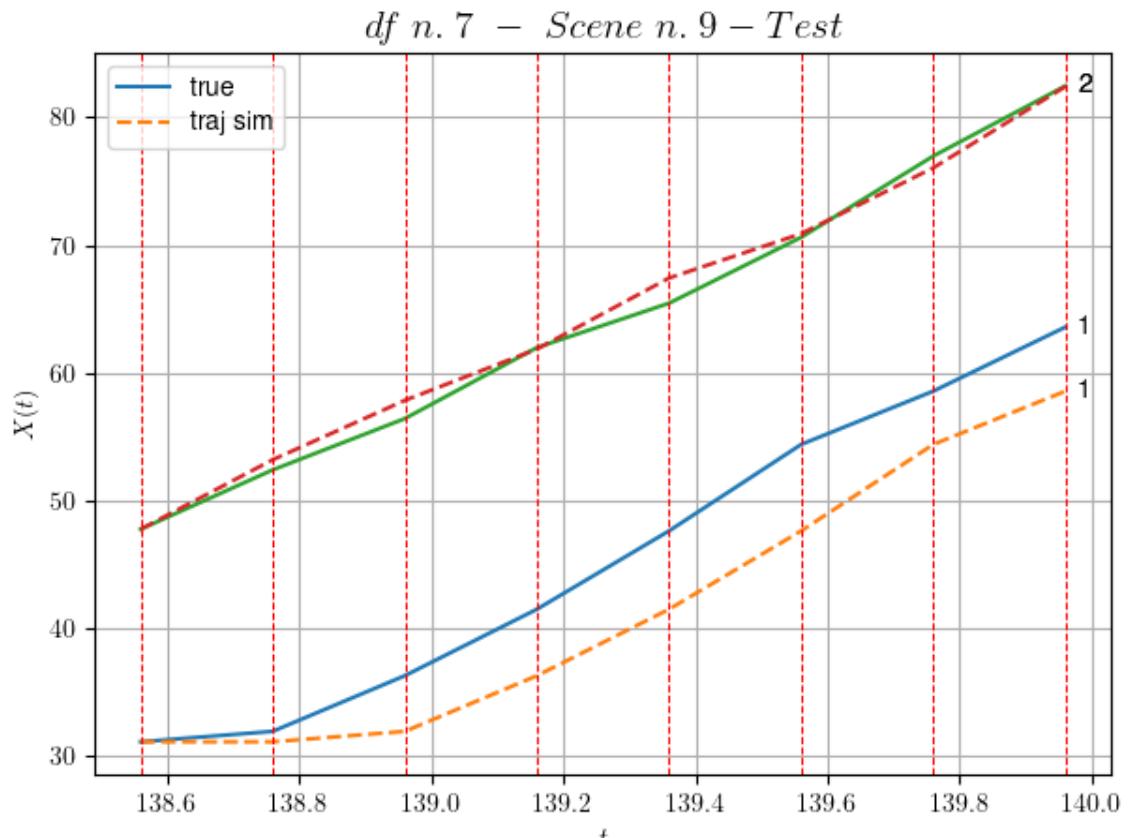
For scene 7/10:
* MSE = 14.218479409954313

DataFrame n.7. Scene n.8/10



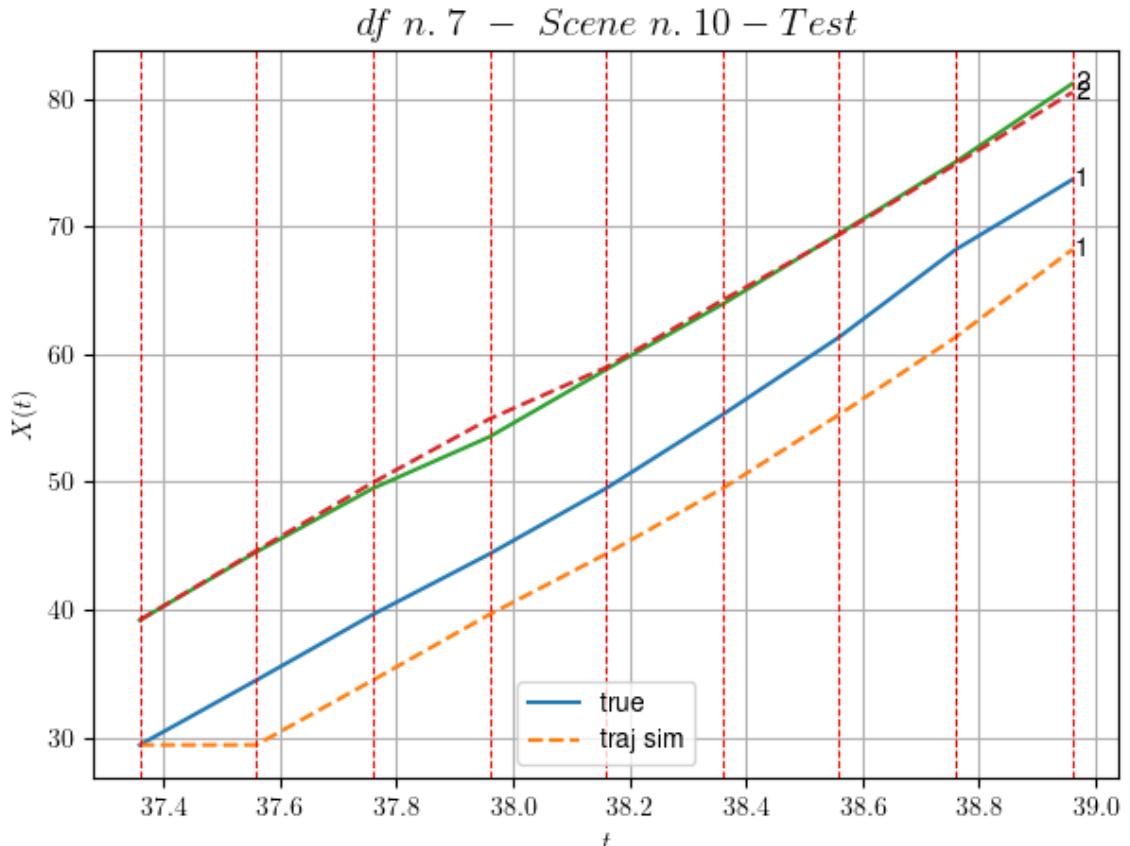
For scene 8/10:
* MSE = 14.850604686820937

DataFrame n.7. Scene n.9/10



For scene 9/10:
* MSE = 11.263841300574942

DataFrame n.7. Scene n.10/10



MSE test: 11.79994773125009

Summing up:
* MSE train: 98.41286266177448
* MSE test: 11.79994773125009

Analyzing 8/10 dfs.

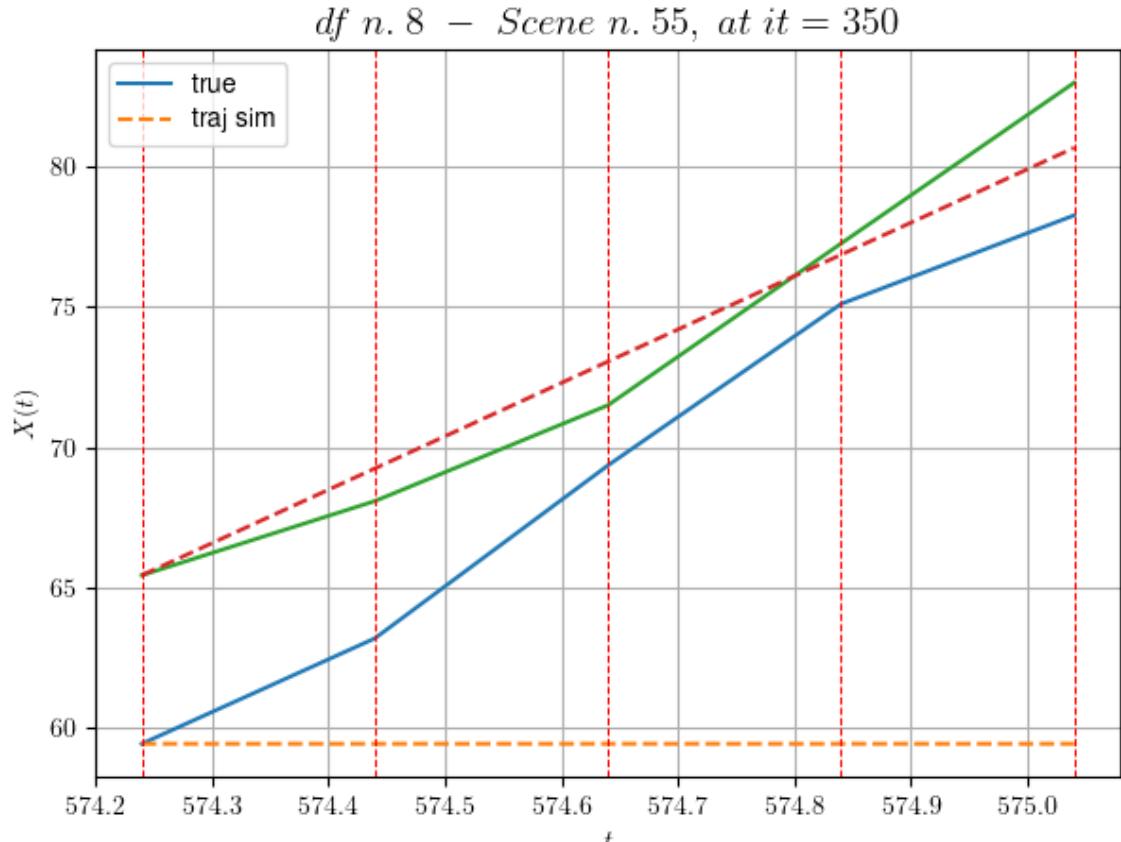
In DataFrame n.8 we have 79 scenes.

To train the model we use 52 scenes, the remaining 27 to test the model.

Training step. (52 scenes)

DataFrame n.8. Scene n.1/52

We have 4 time intervals inside [574.24, 575.04]



For scene 1/52:

- * After LR finder: LR_NN=0.0005 with mse=14.198358307594896

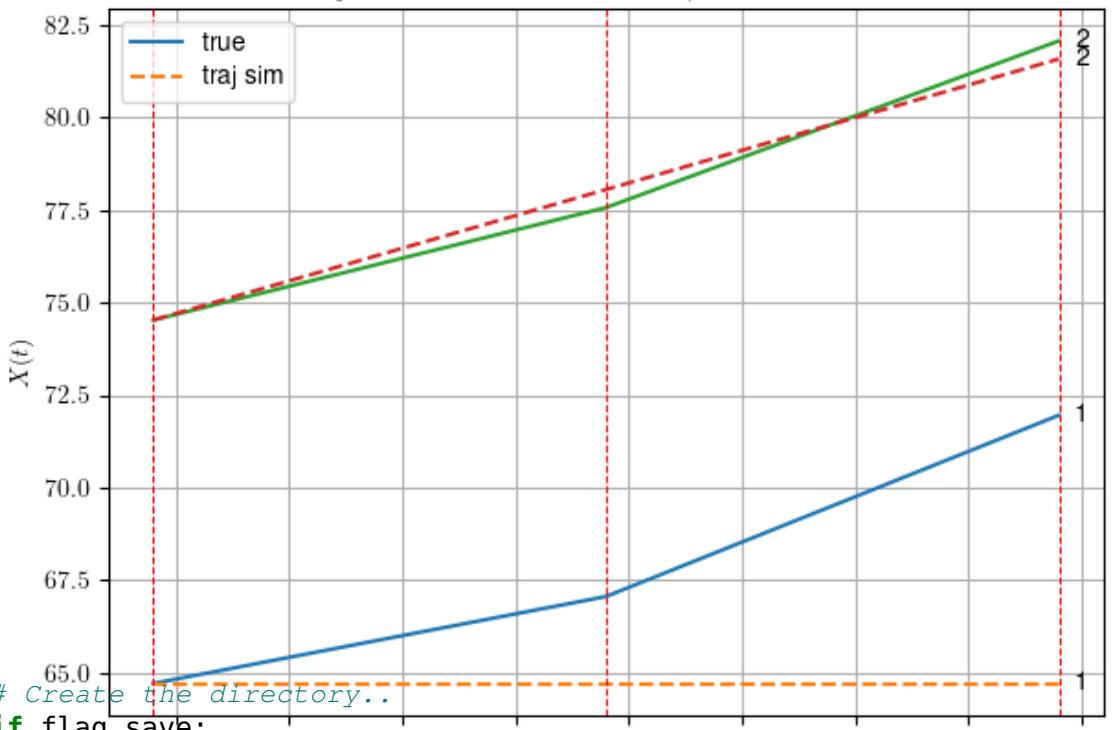
at it=24

- * v0 = 19.077749627059458
- * MSE = 72.34381992592931
- * iterations = 350

DataFrame n.8. Scene n.2/52

We have 2 time intervals inside [194.44,194.84]

df n. 8 – Scene n. 17, at it = 300



```
In [6]: # Create the directory...
if flag_save:
    df_seen = [df['N_file'][0] for df in dataset]
    df_seen_str = '-'.join(str(x) for x in df_seen)

    # Create directory where to save the image
    now = datetime.now()
    d = now.strftime("%Y-%m-%d-%H-%M-%S")
    df_seen_str = df_seen_str + '-' + d
    path = out_dir + df_seen_str + '_NN'
    os.makedirs(path)
    iterations = 300

    # Save the solution in a file
    namefile = '7info_nn4.txt'

    with open(path + namefile, 'w') as output:
        DataFrame_n8_Scene_n_3752_Info_nn4.to_csv(path + namefile, sep=',', index=False)

    # Save model in a file
    We have 8 time intervals inside [458, 64, 460, 24]
    namefile_model = '/model_nn4.keras'
    model_trained.compile(optimizer='SGD', loss='MAE')
    model_trained.save(path + namefile_model) # The file needs to er
```