前提：

1. 共有8个imf分量和1个res余量

imfs = eemd.eemd(DO.reshape(-1),None,8)

1. 85%训练集，15%测试集

c = int(len(DO) \* .85)

注：在LSTM 隐藏层为50，Batch\_size = 32，Epoch = 100情况下，预测结果对比如下（删除了70个异常值）：

|  |  |
| --- | --- |
| 进行异常检测 | 未进行异常检测 |
| RMSE:0.0220 | RMSE:0.0233 |
| MAE:0.0167 | MAE:0.0174 |
| MAPE:6.2962 | MAPE:6.6888 |
| R2:0.9884 | R2:0.9870 |

以下测试，未进行异常值检测。

其中，LSTM50，Activation('tanh')，Epoch=100，batch\_size=16拥有最好的测试效果：

RMSE:0.0205

MAE:0.0160

MAPE:3.9019

R2:0.9863

# LSTM50，Activation('tanh')

## Epoch=10，batch\_size=1

RMSE:0.0212

MAE:0.0167

MAPE:4.1068

R2:0.9853

## Epoch=50，batch\_size=1

RMSE:0.0204

MAE:0.0160

MAPE:3.9218

R2:0.9864

## Epoch=100，batch\_size=1

RMSE:0.0232

MAE:0.0180

MAPE:4.3746

R2:0.9823

## Epoch=10，batch\_size=8

RMSE:0.0244

MAE:0.0184

MAPE:9.5720

R2:0.9868

## Epoch=50，batch\_size=8

RMSE:0.0254

MAE:0.0196

MAPE:13.7694

R2:0.9857

## Epoch=100，batch\_size=8

RMSE:0.0265

MAE:0.0196

MAPE:10.3162

R2:0.9843

## Epoch=10，batch\_size=16

RMSE:0.0213

MAE:0.0168

MAPE:4.1598

R2:0.9852

## Epoch=50，batch\_size=16

RMSE:0.0225

MAE:0.0179

MAPE:4.4647

R2:0.9835

## Epoch=100，batch\_size=16

RMSE:0.0205

MAE:0.0160

MAPE:3.9019

R2:0.9863

## Epoch=10，batch\_size=32

RMSE:0.0404

MAE:0.0355

MAPE:8.9085

R2:0.9466

## Epoch=50，batch\_size=32

RMSE:0.0214

MAE:0.0169

MAPE:4.1824

R2:0.9850

## Epoch=100，batch\_size=32

RMSE:0.0210

MAE:0.0166

MAPE:4.1014

R2:0.9855

# LSTM50，LSTM50，Activation('tanh')

## Epoch=10，batch\_size=1

RMSE:0.0250

MAE:0.0194

MAPE:4.5776

R2:0.9796

## Epoch=50，batch\_size=1

RMSE:0.0244

MAE:0.0188

MAPE:4.5521

R2:0.9806

## Epoch=100，batch\_size=1

RMSE:0.0311

MAE:0.0223

MAPE:5.3390

R2:0.9684

## Epoch=10，batch\_size=8

RMSE:0.0205

MAE:0.0161

MAPE:3.9387

R2:0.9862

## Epoch=50，batch\_size=8

RMSE:0.0214

MAE:0.0170

MAPE:4.1320

R2:0.9850

## Epoch=100，batch\_size=8

RMSE:0.0206

MAE:0.0162

MAPE:3.9604

R2:0.9861

## Epoch=10，batch\_size=16

RMSE:0.0221

MAE:0.0174

MAPE:4.3049

R2:0.9840

## Epoch=50，batch\_size=16

RMSE:0.0208

MAE:0.0163

MAPE:4.0071

R2:0.9859

## Epoch=100，batch\_size=16

RMSE:0.0207

MAE:0.0161

MAPE:3.9025

R2:0.9860

## Epoch=10，batch\_size=32

RMSE:0.0299

MAE:0.0247

MAPE:6.4512

R2:0.9707

## Epoch=50，batch\_size=32

RMSE:0.0213

MAE:0.0169

MAPE:4.1687

R2:0.9852

## Epoch=100，batch\_size=32

RMSE:0.0213

MAE:0.0168

MAPE:4.1189

R2:0.9852

# LSTM50，BP 50，Activation('tanh')

## Epoch=10，batch\_size=1

RMSE:0.0207

MAE:0.0161

MAPE:3.9025

R2:0.9860

## Epoch=50，batch\_size=1

RMSE:0.0212

MAE:0.0164

MAPE:3.9436

R2:0.9853

## Epoch=100，batch\_size=1

RMSE:0.0211

MAE:0.0164

MAPE:3.9820

R2:0.9854

## Epoch=10，batch\_size=8

RMSE:0.0206

MAE:0.0161

MAPE:3.9658

R2:0.9862

## Epoch=50，batch\_size=8

RMSE:0.0212

MAE:0.0164

MAPE:3.9436

R2:0.9853

## Epoch=100，batch\_size=8

RMSE:0.0207

MAE:0.0162

MAPE:3.9243

R2:0.9859

## Epoch=10，batch\_size=16

RMSE:0.0217

MAE:0.0169

MAPE:4.1551

R2:0.9846

## Epoch=50，batch\_size=16

RMSE:0.0209

MAE:0.0163

MAPE:3.9904

R2:0.9857

## Epoch=100，batch\_size=16

RMSE:0.0211

MAE:0.0164

MAPE:3.9820

R2:0.9854

## Epoch=10，batch\_size=32

RMSE:0.0260

MAE:0.0209

MAPE:5.2458

R2:0.9778

## Epoch=50，batch\_size=32

RMSE:0.0207

MAE:0.0163

MAPE:3.9849

R2:0.9859

## Epoch=100，batch\_size=32

RMSE:0.0209

MAE:0.0164

MAPE:3.9957

R2:0.9858