In [6]:

```python
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from pylab import mpl
mpl.rcParams['font.sans-serif'] = ['SimHei']
mpl.rcParams['axes.unicode_minus'] = False

stock_data = pd.read_excel(r'C:\Users\jzc05\OneDrive\Desktop\test.xlsx', index_col = 0,
sheet_name = 0, header = 0)
stock_data.columns
```

Out[6]:

```
Index(['美国运通', '波音', '卡特彼勒', '雪佛龙', '迪士尼', '高盛', '家得宝',
       'IBM', '强生', '摩根大通',
       '可口可乐', '麦当劳', '3M', '默克制药', '耐克', '辉瑞', '宝洁', '旅行者
保险', '联合健康', '联合技术',
       'Visa', '威瑞森通信', '沃尔玛', '埃克森美孚', '苹果', '思科', '英特尔',
'微软', '沃尔格林长靴联盟'],
      dtype='object')
```

In [31]:

```python
stock_data.index
```

Out[31]:

```
DatetimeIndex(['2015-01-02', '2015-01-05', '2015-01-06', '2015-01-07',
               '2015-01-08', '2015-01-09', '2015-01-12', '2015-01-13',
               '2015-01-14', '2015-01-15',
               ...
               '2019-09-17', '2019-09-18', '2019-09-19', '2019-09-20',
               '2019-09-23', '2019-09-24', '2019-09-25', '2019-09-26',
               '2019-09-27', '2019-09-30'],
              dtype='datetime64[ns]', name='日期', length=1194, freq=None)
```

In [37]:

```python
return_stock = np.log(stock_data/stock_data.shift(1))
return_stock = return_stock.dropna()
n = len(return_stock.columns)
vol_port = np.zeros(n)
for i in range(1, n+1):
    weight = np.ones(i) / i
    return_cov = 252 * return_stock.iloc[:, :i].cov()
    vol_port[i - 1] = np.sqrt(np.dot(weight, np.dot(return_cov, weight.T)))
N_list = np.arange(n) + 1
plt.figure(figsize = (8, 6))
plt.plot(N_list, vol_port, 'r-', lw = 2.0)
plt.xlabel('# of stocks', fontsize = 13)
plt.ylabel('std of portfolio', fontsize = 13)
plt.grid('True')
plt.show()
```
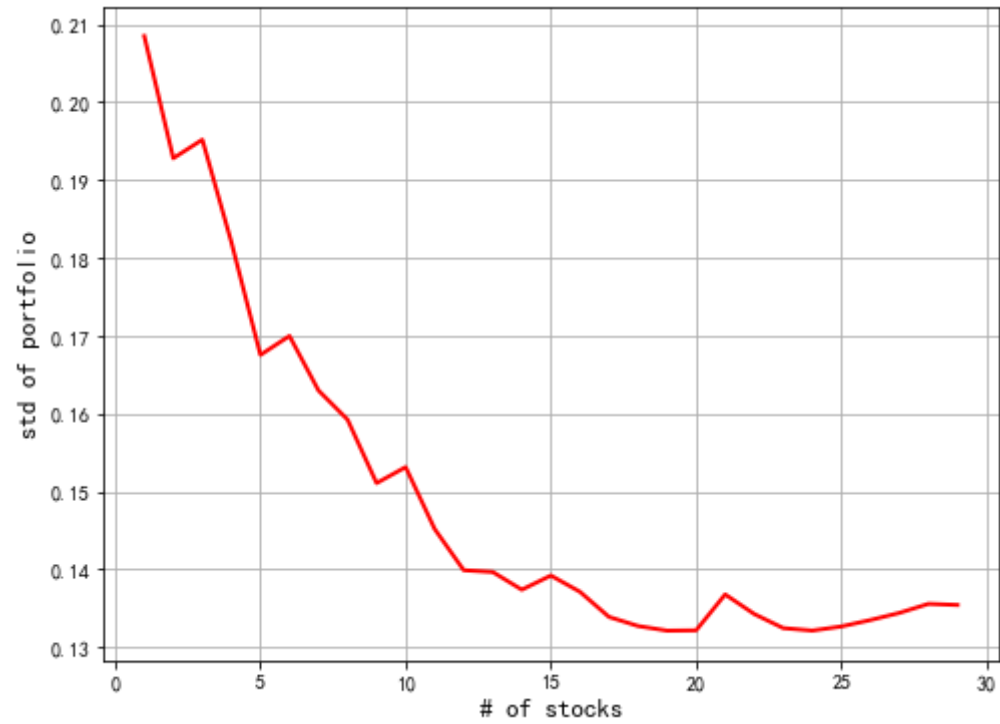
Out[37]:

日期
2015-01-05
2015-01-06
2015-01-07
2015-01-08
2015-01-09
...
2019-09-24
2019-09-25
2019-09-26
2019-09-27
2019-09-30

1193 rows × 0 columns