Jun-peng Zhan, Chuang-xin Guo, Qing-hua Wu, Lu-liang Zhang, Hong-jun Fu, 2014. Generation maintenance scheduling based on multiple objectives and their relationship analysis. *Journal of Zhejiang University-SCIENCE C (Computers & Electronics)*, **15**(11):1035-1047. [doi:10.1631/jzus.C1400030]



# Generation maintenance scheduling based on multiple objectives and their relationship analysis

**Key words:** Generation maintenance scheduling, Market environment, Multi-objective optimization

Corresponding author: Chuang-xin Guo
E-mail: guochuangxin@zju.edu.cn

# Motivation

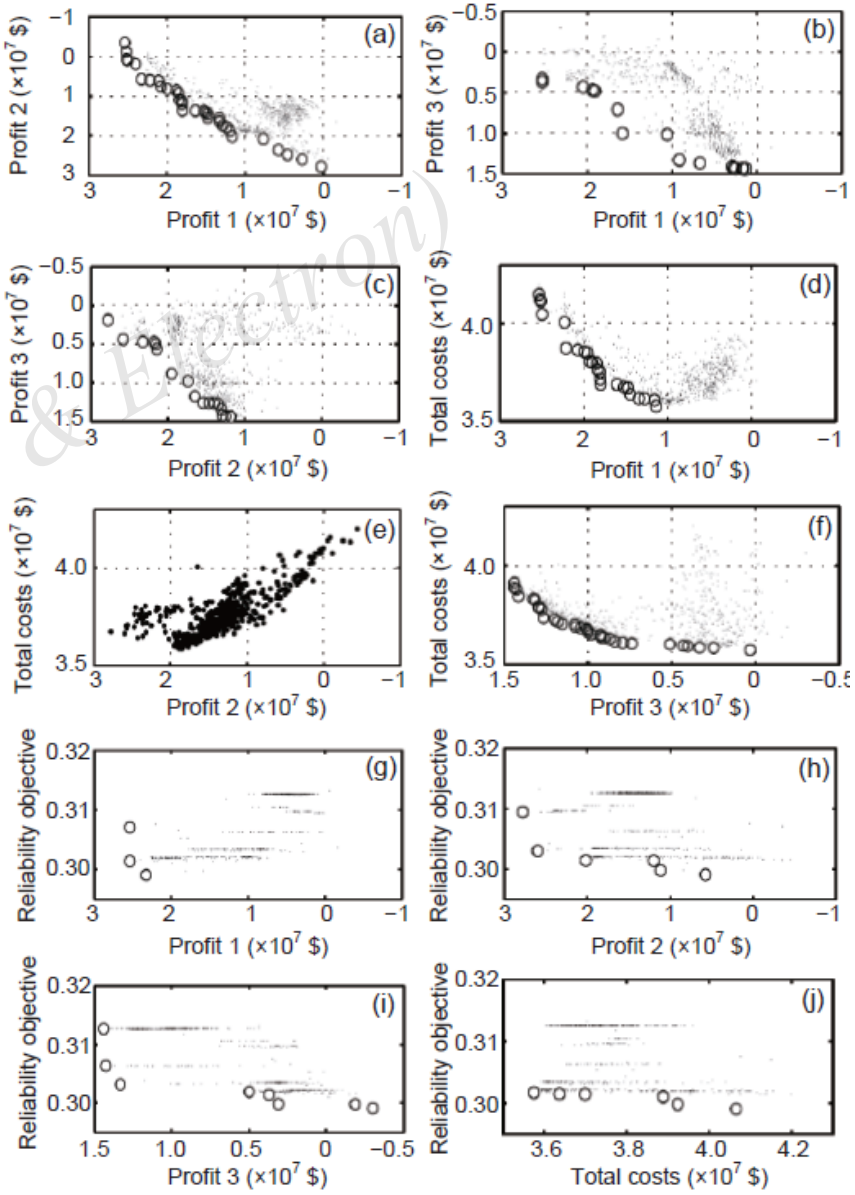
- The conflicting relationship between the ISO and each producer has not been clearly analyzed
  - Are every two objectives conflicting with each other?
  - What are the characteristics of the Pareto fronts between each two objectives?
  - What is the cause for the conflicting relationship?
- The analysis provided is expected to
  - help to understand the objectives' relationship
  - help to choose objective functions better
  - help to make a more reasonable decision

# Method

- To solve the generation maintenance scheduling by group search optimizer with multiple producers (GSOMP):
  - the maintenance status of generators is encoded into integer variables
  - both the online status and the start-up status are treated as intermediate variables represented by the generation variables

# Major results

- One producer's profit and another one's profit have a conflicting relationship as shown in subfigures (a)-(c)
- The profit of producer 1 conflicts with the total generation costs as shown in subfigure (d)
- The profit of producer 2 and the total generation costs have a positive correlation relationship as shown in subfigure (e)
- The profit of producer 3 conflicts with the total generation costs as shown in subfigure (f)
- The reliability objective also conflicts with the other objectives as shown in subfigures (g)-(j)



# Summary

- The simulation results illustrate that one producer's profit conflicts with another one's profit for the reason that
  - each producer tends to maintain its own units in the lowest-price weeks but the maximal capacity in maintenance in each week is limited
  - each producer tends to generate more power but the load in each day is fixed
- The simulation results also indicate that the profit of the producer with the cheapest units does not conflict with the total generation costs while the other producers' profits conflict with the total generation costs
- The proposed reliability objective also conflicts with the other objectives and can help to obtain a certain amount of reserve capacity in both high-demand and low-demand periods