ABC for loading pattern optimization

Safarzadeh et al. (2011) consider loading pattern optimization of PWR reactors.

Questions

1. Explain the problem of nuclear core loading. Why is optimization needed? What methods have been used for this problem? Describe briefly at least two methods and comment on the obtained results.

2. Implement the ABC algorithm and compare it on an artificial example to another known method. Explain the advantages and shortcomings of both methods for the particular example you considered.

References

Safarzadeh, O., Zolfaghari, A., Norouzi, A., and Minuchehr, H. (2011). Loading pattern optimization of PWR reactors using Artificial Bee Colony. *Annals of Nuclear Energy*, 38:2218–2226.