Review of: "Mathematical Assessment of the Reliability in a Complex Deregulated Power System"

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Potential competing interests: No potential competing interests to declare. No competing interests

Peer Review Report

Mathematical Assessment of the Reliability in a Complex Deregulated Power System

1. The introduction provides a comprehensive overview of the context and challenges associated with the reliability assessment of complex deregulated power systems. It is well-structured and effectively outlines the key points. Here are some suggestions and considerations:

a. Precision:

- The phrase « evaluation of the reliability of a complex deregulated power system » is repeated « evaluating the reliability of a complex deregulated power system ». You might consider varying the language for diversity.

b. Environmental Considerations:

« Incorporating environmental considerations inherent to decentralized systems becomes pivotal in verifying system reliability within the broader network of bulk power system ». It would be beneficial to elaborate briefly on the specific environmental factors considered.

2. Fig 3 is not centered on the page.

3. The symbol μ has not been addressed in terms of its significance or meaning.

4. Section 2 requires at least one paragraph that introduces and explains the two Figures.

5. Section 4 : « To identify transmission deficiencies, we propose a comprehensive set of analyses, encompassing Dynamic Analysis, Control Analysis, and Recovery Analysis » -à Provide a brief overview or examples of comprehensive set of analyses proposed : Dynamic Analysis, Control Analysis, and Recovery Analysis. This would help readers understand the practical implications.

6. There is a glaring inconsistency in the statement, "To identify transmission deficiencies, we propose a comprehensive set of analyses, encompassing Dynamic Analysis, Control Analysis, and Recovery Analysis [24]." On one hand, the authors proposed comprehensive set of analyses, encompassing Dynamic Analysis, Control Analysis, and Recovery Analysis, and on the other hand, they attribute the statement to reference number [24]. Please address this discrepancy to

ensure accurate attribution in the paper.

7. There is an ambiguity in the statement, "If the sources at the load side are increased by three units, the units will be encaged by DG's and the third unit is installed with the FACTS devices." The mention of "sources at the load side" is not clear, and the expression "encaged by DG's" also appears ambiguous. Additionally, the sentence could benefit from clarification on why the installation of DGs and FACTS together should be done in this manner.

8. Minimization Function: It would be beneficial to explain the minimization function in more detail. What parameters does it consider, and how does it determine the optimal placement of new sources at busses 6, 4, and 2?

9. The authors did not specify the parameters of the studied network.

10. Reliability Index Verification: Specify how the reliability index is verified with the inclusion of DGs. What metrics or indicators are used to measure reliability?

11. Fig 4 : poor quality ; Cases 1, 2, and 3 lack explicit definitions and meaningful discussion within the body of the paper.

12. Conclusion : The authors asserted that "This paper primarily focuses on performance-based regulation within the bulk power system", yet the results are derived from a smaller network comprising only 14 bus sets.

13. The authors assert that "This optimization process is accomplished through the utilization of Genetic Algorithms"; however, no section has been provided to address or discuss this algorithm. Furthermore, a brief explanation is warranted to elucidate the rationale behind choosing Genetic Algorithms for optimization and to highlight the advantages they bring to this specific context.

14. The authors state that "This study explores the impact of different Flexible Alternating Current Transmission System (FACTS) devices on the IEEERTS system and calculates the corresponding Expected Energy Not Supplied (EENS)," however, no section has been provided to address or discuss these various FACTS devices used. Furthermore, a brief explanation is warranted to elucidate the rationale behind choosing UPFC and to highlight the advantages it brings to this specific context, and the significance of finely tuned control settings in achieving minimal EENS.

Decision. This work needs more presentation of results (tables, figures, comparisons with other works, etc.) and a deeper dive into explanation and discussion, as a single Figure is not sufficient. Furthermore, the authors state things or results that have not been achieved or do not exist in the paper.--à declined