

## 核融合炉の電力網への導入限界の評価を目的とした 電力網安定性ダイアグラムとその応用による導入戦略の考察

### A Novel Diagram on the Limitations of Fusion Plant Installation to Power Grids and its Applications on Strategy Planning

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More and more renewable and nuclear power sources are being installed especially in developing countries, which is likely to make future power grids unstable. Therefore, quantitative feasibility studies of nuclear fusion plant installation from the aspect of grid stability were needed for development strategies.

For this purpose, the authors established a simplified model on Matlab/Simulink to simulate the utility frequency of the grid.

The grid experienced sharp utility frequency drops upon a sudden output interruption, e.g. a plasma disruption, of nuclear fusion power plant. The results showed that larger share of renewables and nuclear leads to larger deviations of frequency upon a sudden interruption of fusion plant. (Fig. 1.)

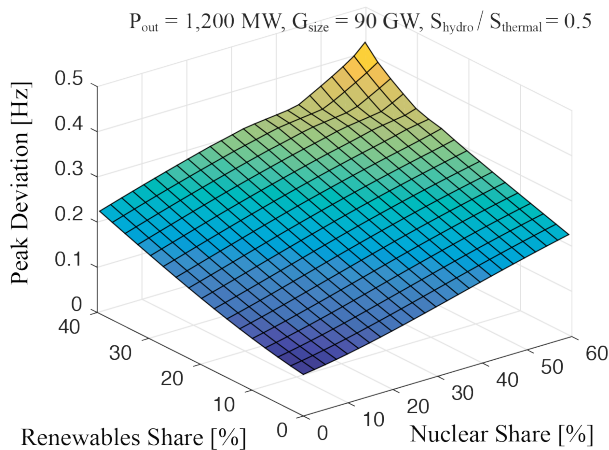


Fig. 1 Peak Frequency Deviation under the Effect of Renewable and Nuclear Power Sources

Many power companies have a control target of the frequency. (E.g.  $\pm 0.2 \text{ Hz}$ ) Therefore, if expected to cause frequency deviations larger than the control target, the local power company would not allow the fusion power plant to be constructed. (Fig. 2.)

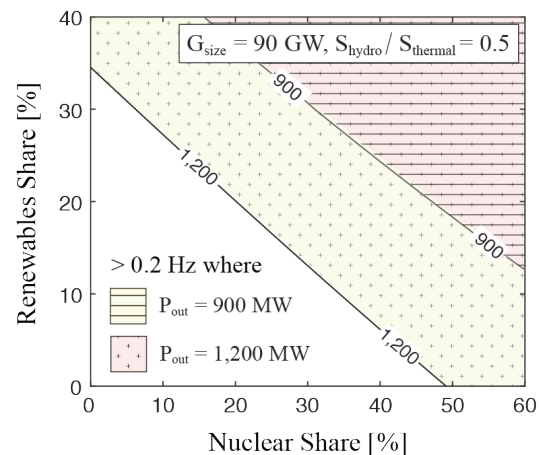


Fig. 2 Suggested Limitations of Fusion Plant Installation

In order to plainly shows the essential findings of the simulation results, a new diagram was established and presented by the authors. (Fig. 3.)

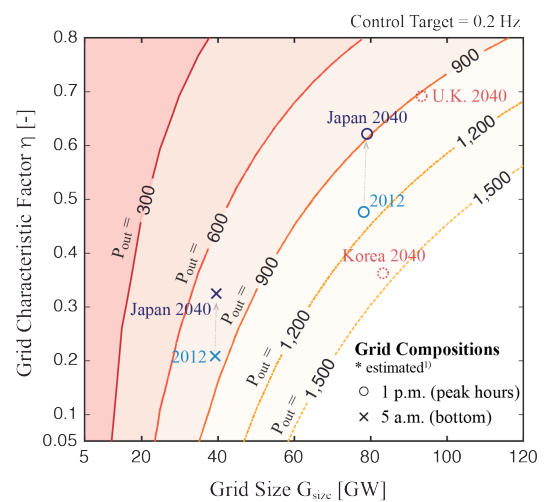


Fig. 3 The New Diagram Established by the Authors