Dynamic Reactive Power Optimization for Tokamak Coil Systems: A Case Study on Aditya-U.

Abstract

The pulse power supplies of Aditya-U Tokamak draw highly fluctuating pulsed power from the electrical grid, leading to significant transient variations in both active and reactive power. Such rapid and large-scale power fluctuations pose challenges to grid stability, voltage regulation, and overall power quality. To ensure reliable operation of the tokamak and minimize adverse impacts on the grid, it is essential to implement a fast and efficient reactive power compensation mechanism capable of dynamically responding to load variations.

This project includes a comprehensive study of various reactive power compensation techniques, including conventional and advanced dynamic methods, with an emphasis on their suitability for pulsed high-power applications. Based on the analysis, an appropriate dynamic control strategy is proposed for real-time management of reactive power demand in the tokamak system. The proposed approach aims to enhance voltage stability, improve power factor, and ensure compliance with grid parameters during transient operating conditions.

Academic Project Requirements:

1) Required No. of student(s) for academic project: 2

2) Name of course with branch/discipline: B.E./B.Tech. Electrical

3) Academic Project duration:

(a) Total academic project duration: 8 Weeks
(b) Student's presence at IPR for academic project work: 3 Full working Days per week

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