

Integration of Multi Terminal Unified Power Quality Conditioner in Microgrid System

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ABSTRACT:

Electrical Power Quality (EPQ) is fetching more of a concern as smart grid technology advances, in distribution systems. A proposal for MT-UPQC integration in a microgrid system (G) is presented here. This paper presents configurations of UPQC, MT-UPQC, UPQC_{μG} and MT-UPQC_{μG} and comparison between them. MT-UPQC_{μG} combines the advantages of both MT-UPQC and UPQC_{μG}. The MT-UPQC can correct for voltage quality issues, harmonic currents and reactive current in a variety of ways depending on the needs of the user. On the MATLAB Simulink platform, a 3T-UPQC_{μG} microgrid is constructed for simulation and verified the same. The obtained results of simulation, suggest that the proposed method is both effective and adaptable.

Key Terms: Microgrid (μG), Active Power Filter (APF), Electrical Power Quality (EPQ), Distributed Generation (DG), Multi terminals (MT), Unified Power Quality Conditioners (UPQC).

I. INTRODUCTION

The solution for small scale power system is a Microgrid. It includes local generation and storage [12]. Microgrids generate electricity using distributed energy resources (DERs). Fuel cells, PV systems, and wind energy systems which are the Renewable energy sources, are extensively utilised DERs. EPQ issues are often caused by either supply voltage or load current distortion [13]. Maintaining EPQ is a critical consideration while running a microgrid system in either grid-connected or isolated mode [8]. According to recent research, the UPQC is a low-cost power device that may be used at the PCC to safeguard both the utility and the consumer against EPQ distortion [11].

A power quality control device named MT-UPQC, which consists of multiple shunt APFs near the end users and single series APF in the grid side. MT-UPQC is already implemented in the distributed generation [1]. In this paper, Multi terminal UPQC concept in the Microgrid called MT-UPQC_{μG}, which address PQ issues of multiple users connected to the different feeders is presented. The MT-UPQC system comprises of a series APF and many parallel APFs which share a common DC-link energy store capacitor in the Microgrid system. Aim of the proposed paper is to deal with voltage imperfections of the grid and load current imperfections of the multiple users connected to the different feeders.