



# power quality assessment of microgrid

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*"To my beloved Father, Mother, Wife and My daughters"*

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## ABSTRACT

This work manages the rising issue of managing power quality issues, and goes for appraisal of the effect of new shrewd advancements on existing electrical distribution systems from the unwavering quality perspective. A primary point in the investigation performed in this work is the portrayal of the electric burdens display in the up and coming microgrids. The power quality assessment has then been performed to mitigate the concerns of utilities on power quality issues, this study determines the near-optimal allocation of capacities and locations of DG systems and then analyzes the impact of Nowadays, one of the main goals of utilities is to enhance their microgrids by various distributed generation (DG) systems with capacities in the range of several kW to hundreds of MW. In spite of the relatively small individual capacities of DG systems, their cumulative effects on the distribution network may change the steady-state and transient behaviors of the network decrease on which they are installed. In other words, DG systems can reliability and power quality, particularly by an increase in overvoltage resulting from the installation of DG systems on distribution networks. DG systems on the overvoltage issue in a steady state. For this purpose, the proposes a genetic algorithm that near optimally allocates the locations and the capacities of DG systems on distribution networks at peak load and an objective function that minimizes voltage variations of such networks. In addition, this study implements a volt/var control algorithm that utilities can use to improve the voltage profile along their feeders by adjusting the amount of reactive power to be injected into the grid. the characteristics of Micro-Grid, the present research status, and the key advancements of Smart Grid.

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### LIST OF SYMBOLS

|                   |   |                          |
|-------------------|---|--------------------------|
| $X_d''$           | - | subtransient reactance   |
| $X_d'$            | - | transient reactance      |
| $X_d$             | - | synchronous reactance    |
| $Z$               | - | impedance                |
| $V_l$             | - | voltage regulators       |
| $IX$              | - | inductive impedance drop |
| $Q$               | - | reactive power           |
| PF                | - | power factor             |
| $\delta$ critical | - | economic factor          |
| $\delta$          | - | technical factor         |
| $S$               | - | apparent power           |

**LIST OF ABBREVIATIONS**

|                 |   |                                   |
|-----------------|---|-----------------------------------|
| AC              | - | Alternating Current               |
| ATS             | - | Automatic Transfer Switch         |
| CC              | - | Central Controller                |
| CHP             | - | Combined Heat and Power           |
| CO              | - | Carbon monoxide                   |
| DC              | - | Direct Current                    |
| GHG             | - | Greenhouse gas                    |
| HVAC            | - | heat ventilation air conditioning |
| IGBT            | - | insulated gate bipolar transistor |
| LV              | - | Low Voltage                       |
| MG              | - | Micro-Grid                        |
| NO <sub>x</sub> | - | Nitrogen Oxides                   |
| PCC             | - | point of common coupling          |
| PV              | - | Photovoltaic                      |
| P/Q             | - | Active and Reactive Power         |
| SOFC            | - | solid oxide fuel cell             |
| So <sub>x</sub> | - | Sulfur oxides                     |
| T&D             | - | transmission and distribution     |
| TES             | - | thermal energy storage            |
| THD             | - | Total harmonic distortion         |
| UPS             | - | uninterrupted power supply        |
| +PG             | - | export active power               |
| ±QG             | - | export or import reactive power   |

