

Abstract

This research presents a method for dynamic small-scale studies on power systems including photovoltaic (PV) energy utilities taking into account the effects of dc-side components. Existing methods often design a PV system as a dc source, which is connected to a grid-bonded inverter. This research shows that the dc components in a PV energy system can also contribute to the dynamics in the range of signal studies in the power system. This research develops the PV energy model first by combining the sub models of components-and ac-side. Then, the study system describes a method of obtaining the augmented model of a system including a PV energy system. Perturb and Observation (P & O) method is used as Maximum Power Point Tracking (MPPT) for fast quick response. The Fast Fourier Transform (FFT) analysis shows that the Total Harmonic Distortion (THD) is maximum without any inverter circuit while THD is minimum after an inverter output. A Standard THD of 3.49% is obtained in Simulink during FFT analysis.