

This paper presents a novel centralized positive and negative sequence control strategy for enhancing the unbalanced operation of electric transmission networks. The proposed control strategy is deployed as an effective ancillary service provided by a photovoltaic power plants. The excess capacity of grid-tied inverters is utilized based on a novel centralized positive and negative sequence reactive current division algorithm. The control strategy dynamically allocates the amount of reactive power compensated by each inverter in the power plant according to its active power generation level. The performance of the proposed control strategy is evaluated for a photovoltaic power plant connected to the IEEE 12-bus Flexible AC Transmission Systems test system in steady-state and transient operation. This is demonstrated through unbalanced loads and asymmetrical grid faults. The proposed control strategy effectively reduced the voltage unbalance factor within the acceptable operating limits, and enhanced the transient response at the transmission level interconnection. This is achieved in order to adhere to grid codes' requirements and the IEC 61000-3-13 standard.

