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Solar Integrated Cascaded Topology of Multilevel Inverter Using Interval Type-2 Fuzzy Logic Controller

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Abstract—With the evolution of an advanced power system concept, green power supplies, comprising transmission and distribution designed networks, were progressively implemented in this research. Consequently, optimum usage of cascaded H-bridge inverter topologies and power distribution activities is crucial for long-term production. Selective harmonics elimination techniques have always been required to attain the appropriate switching frequencies of multilevel inverters. This study aims to estimate the switching frequency for solar-integrated multilevel inverters utilizing boost converters to decrease the total harmonic contents utilized in grid applications. This study contributes to the optimum feasible solution by utilizing a number of recently discovered dynamic controller methods: Type I Fuzzy controller and Interval Type II Fuzzy controller. Seven-level, eleven-level, and fifteen-level MLIs minimize overall harmonic components. The dependability and convergent rates of simulation results with different modulation indices are produced and compared for seven-, eleven-, and fifteen-level MLIs. In addition, as compared to existing control systems, the suggested controller reduces Total Harmonic Distortion and delivers stabilized output power. The suggested IT2-FLC is compared against an T1-FLC and a standard mathematical PI controller.

1. INTRODUCTION

The continued advancement in electricity consumption that there is a need for healthy and clean electricity for pollution control has led to an emphasis on sustainable power (SP)-based electricity production, which is growing internationally. As a result, solar PV technologies are becoming more popular among grid-integrated Renewable technologies [1]. For DC-AC conversions, the Cascaded Multilevel Inverter is linked through the conjunction of a photovoltaic panel and batteries. The suggested topologies primarily benefit from supplying energy from the supply to the demand even under faults and partially shadowed situations. The study also

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