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Implementation of Artificial Neural Network Controller for Double-input Boost Converter

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ABSTRACT

This paper describes the design of an artificial neural network (ANN) control with power sharing control abilities of a new proposed double-input boost power converter (DIBC). The goal of this research is to model and design a high effectiveness and great performance double-input power converter for renewable energy applications. First, an artificial neural network controller design which is flexible versus a variable input voltage resource and variable load (to achieve the line regulation test and load regulation test) is proposed. Lastly, the suggested concept has been validated through experimentally on the laboratory prototype by using DSP TMS320F28335 real-time digital control. The experimental outcomes emphasize the authenticity of the suggested topology, which can be promising a novel topology that includes double-input power converter appropriate for renewable energy application systems.

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1. INTRODUCTION

Global warming and the depletion of the non-renewable resource have highlighted the importance of renewable electric power technologies. Coal and fuel electric power generators have significant impacts on world energy consumption and carbon dioxide emissions. Thus, solar array and the wind turbine have become important sources of renewable electric energy. They offer many advantages as a quiet, clean, free, never-ending source and requiring little maintenance. For this reasons, the demand for alternative electric energy sources is increasing each year.

The single input direct current converters are linked to the electrical source like the normal battery, wind turbine, and other resource power with (I-V) characteristic and output port can be joint with direct current in-parallel or in-series [1]–[5]. Thus, diverse power resources can be conjoined either in-parallel [6], [11], [12] or in-series [13]–[15], [21] with the electrical-linked multi-input converters topology. However, the major constraint of the input resource topology linked in-parallel configuration is mandatory of input resource to asymmetric at the same time, one input resource supply power to the electrical load to shun power from the coupling impact. The series connection the input resources are important to supply power at same time. Thus, in-series arrangement, using one power diode, for each input resource enable avert, other input voltage resource to shape the parallel-connections configuration, that the excess number of electronics component [18]–[20].