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Using an ANN controller, active filter control strategies for renewable energy generation systems

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Abstract

Multi-day renewable energy generation is currently the developing new problem in the manufacturing industry, but in order to connect it to the grid, we needed high power static PWM converters, which are one of the causes of aggravation in our system's power quality. As a result, in this paper, we propose a different control method that makes use of a phony neural network model that is applied in a special power channel. The ANN controller not only enhances the power quality but also enhances the By drowning out the melody, it also improves the existing full scale consonant bowing. Two control techniques, such as the PI controller and the ANN controller, are used to replicate the dynamic power channel. The results of the proliferative process and the incredible structure demonstrate the prevalence of ANN controllers over PI controllers. The suggested circuit is tested under various operating conditions using proliferation in MATLAB/SIMULINK, and the outcome demonstrates the strength of the design.

Introduction

Today's large number of PCs and other sensitive electrical loads connected to the power cross segment are undoubtedly impacted by control quality problems [1].Current music, created by the growing number of non-direct loads connected to the power structure, such as diode and thyristor frontend rectifiers[2], is recognized as one of the most essential problems. As a result, these songs may result in voltage bendings [3], further effect structure disasters, and the failure of delicate electronic devices. Symphonious impediment checks, like IEEE 519, are made going ahead [4].

PROPOSED SYSTEM TOPOLOGY

Hybrid power generation system with a shunt activepower filter [5]. The voltage in any leg x of the converter, canmeasured from the neutral factor (n), can be expressed in phrases of switching states, as follows [6]:

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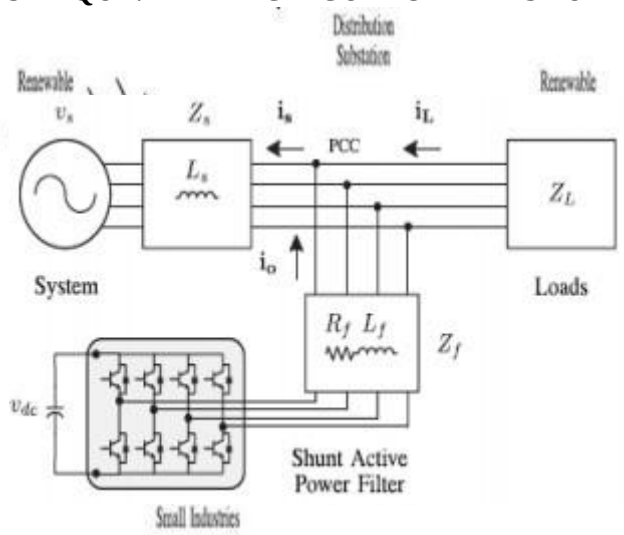
PHASE EQUIVALENT CIRCUIT OF THE SHUNT ACTIVEPOWERFILTER.



2-level four-leg PWM-VSI topology.

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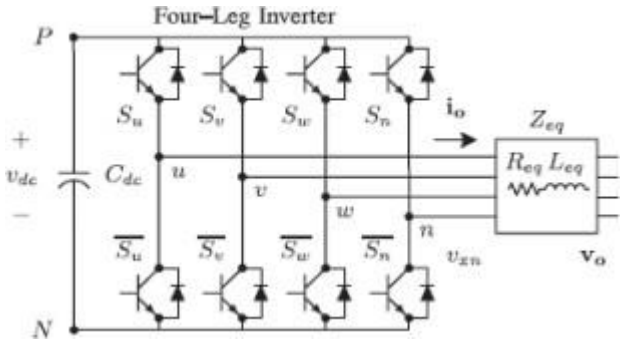
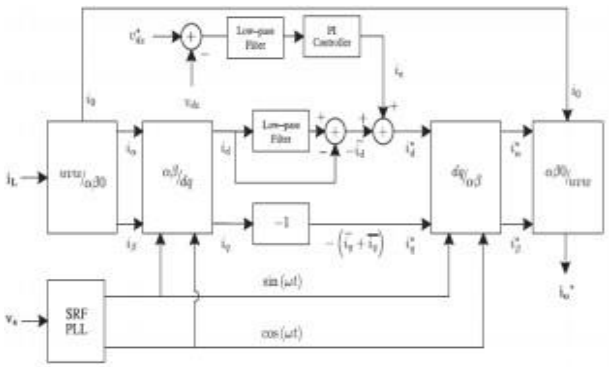


DQ-BASED CURRENT REFERENCE GENERATOR BLOCKDIAGRAM.



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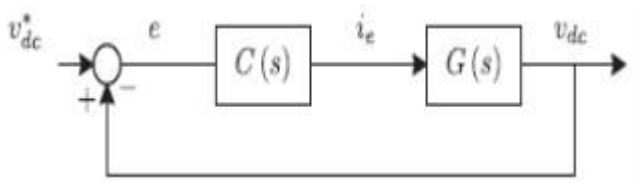
DC-VOLTAGE CONTROL BLOCK DIAGRAM.



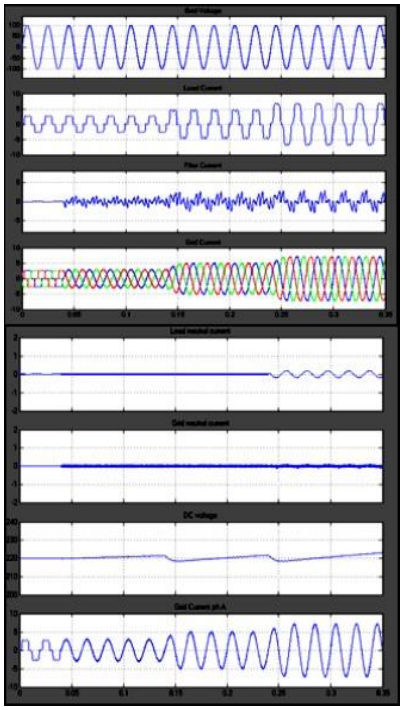
ANN BASED CURRENT CONTROLLER

Simulated waveforms of the control scheme (a) Phase toneutral sourcevoltage (b) LoadCurrent (c) Active powerfilter output current

(d) Loadneutral current (e) System neutralcurrent (f) Systemcurrents.

(g) DCvoltage converter (h) grid current

% THD USING PI CONTROLLER



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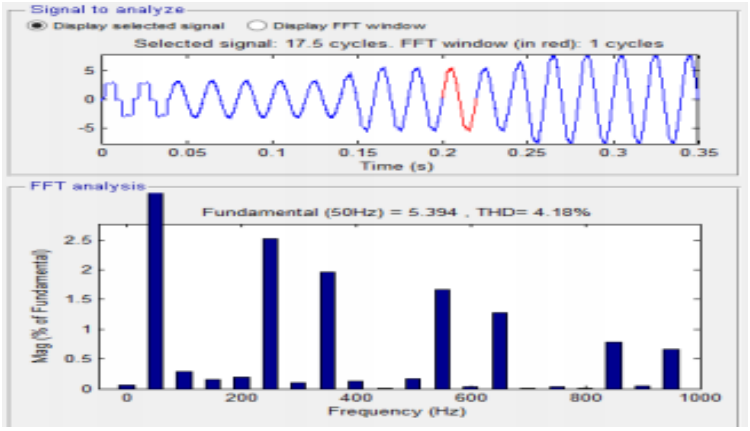
%THD USING PI CONTROLLER



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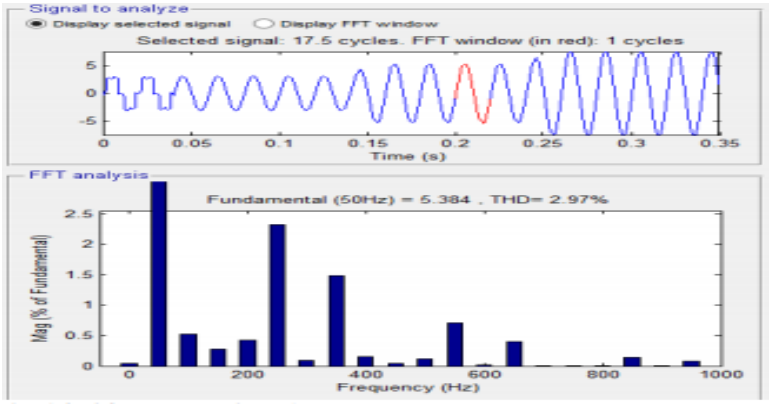

% THD USING ANN CONTROLLER.

CONCLUSION

The unique power direct based on a free forward ANN controller has been acknowledged in MATLAB/Simulink. The various results are shown to demonstrate how well the designed ANN controller fits the situation. while using a PI controller, the dynamic power channel's source current THD is 4.18%; however, while using an ANN controller, it is 2.97%. Under various nonlinear weight conditions, the performance of the created ANN controller for the dynamic power channel is attempted, and its numerical results are listed in a table. Therefore, it can infer that the ANN controller is more sensible than the PI controller based on the obsession working out as anticipated.

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