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Comparative Between the Control Artificial Neural Networks Techniques and the PI Control of a DFIM Integrated in a Wind Turbine

Chandad Abdelmoumen, Hamouda Messaoud and Benharir Nadjadi

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A. Chandad [1*], M. HAMOUDA[2], N.Benharir[1]

[1] A. Chandad [1]Laboratoire LAAS, Ecole Nationale Polytechnique – Maurice Audin d'Oran, Algérie
[2] M. HAMOUDA [2]Laboratoire LDDI, Faculté des Sciences et de la Technologie, Université Ahmed Draia , Adrar, Algérie

[3] N.Benharir [1]Laboratoire LAAS, Ecole Nationale Polytechnique – Maurice Audin d'Oran, Algérie

*correspondence E-mail: **chandadaem@gmail.com**

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ABSTRACT

This work deals the comparative between the control by artificial neural networks techniques and the classical direct vector control PI of a DFIM integrated into a wind turbine. The system is based on a doubly fed induction machine (DFIM) and connected to the constant frequency network. We applied a vector control based on the orientation of the stator flow of the machine to independently control the active and reactive powers between the stator and the network and we applied the neuron control for see the variation of behavior on the system. The results obtained in simulation were validated compared to the work of the articles cited in the bibliography

. SIMULATION RESULTS

Figure 1 presents the simulation results of the active and reactive power of the DFIG generator coupled to the wind turbine, with a variable wind speed of average value equal to $\mathbf{16}\boldsymbol{m/s}$ and a pitch angle of the blades of $\mathbf{5}°$. Note that the fluctuations are represented at the power level due to the variation of the wind on the one hand and on the other hand to the PWM technique because of the switching of the switches of the inverter. The results obtained clearly show the non-linearity of the system and the coupling existing between the different variables of the DFIM. So, to eliminate the existing coupling, we use vector control which allows having an independent control of the active and reactive power and a control of the power factor

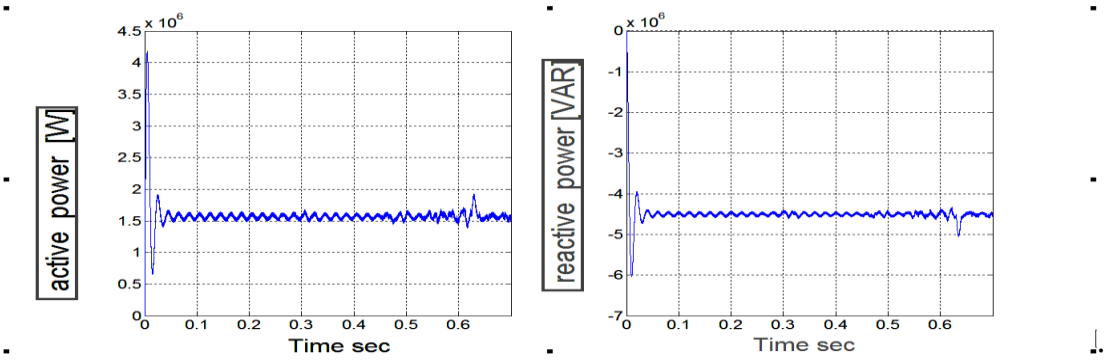

Figure1. Simulation results of the active and reactive power of the DFIG generator coupled to the wind turbine.

Figure 2 illustrates the system responses with two controllers (vector PI, neuron PI). Generally speaking, we can notice that the power steps are followed by the generator for both active and reactive powers.

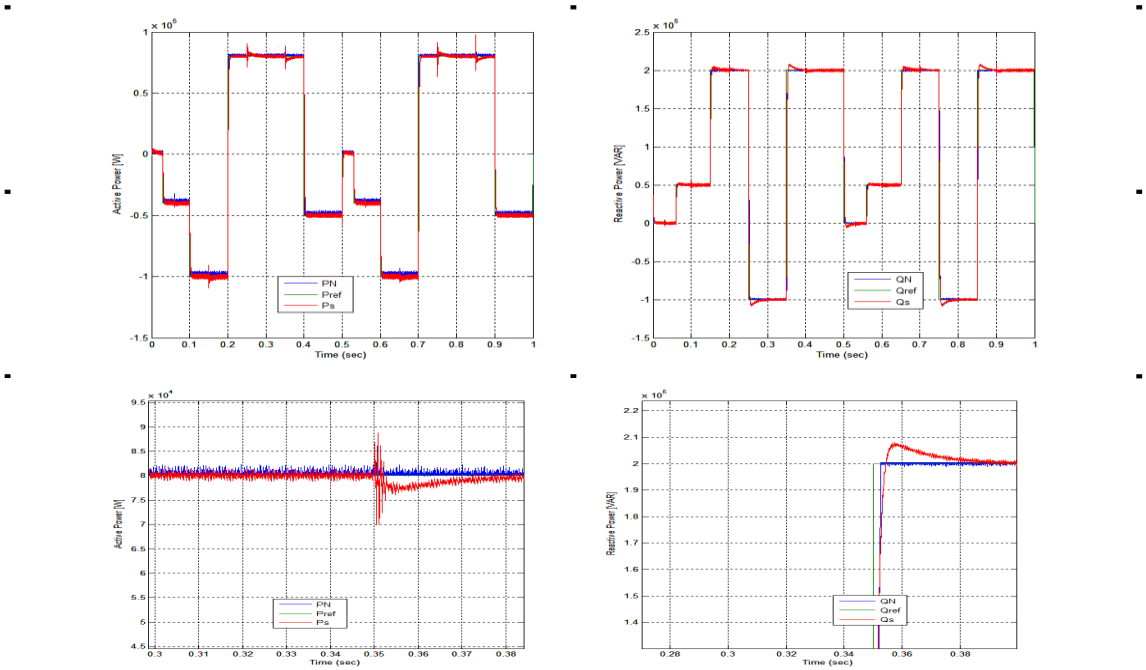

Figure.2. the system responses with two controllers (vector PI, neuron PI)

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