Simulation of ARMAX model for Forecast of Power Output of PV Grid

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***Abstract*—This work is devoted to the simulation of an ARMAX model proposed in the literature for better forecasting of power output of a Photo-Voltaic (PV) grid; the model includes information of environmental inputs (average temperature, precipitation amount, insolation duration, humidity) that classical time series approaches did not include. The simulation is performed using three different noise distributions in order to establish a comparison of the time series.**

***Index Terms*—**

I. Introduction

II. Problem Formulation

III. Theoretical Approach

A. General ARMAX model

As previously mentioned, this work uses an ARMAX model presented in the literature; hereby, let the general ARMAX model be presented:

$$z_{t+1} = \sum_{i=0}^{h_1} a_i z_{t-i} + \sum_{i=0}^{h_2} b_i u_{t-i} + \sum_{i=0}^{h_3} c_i \xi_{t-i} \tag{1}$$

for $t = 0, 1, 2, \ldots$, and u_k are external inputs and ξ_k are random noises. In this specific case, the model obtained in [1] is:

$$\begin{aligned} z_t =& 237.565 + 0.426 z_{t-1} + \xi_t - 0.153 \xi_{t-1} + 8.9087 u_{1,t} \\ & - 1.557 u_{7,t} + 31.919 u_{8,t} - 2.045 u_{9,t} \end{aligned} \tag{2}$$

where z_t is the power output of the PV grid in Watts (W); $u_{1,t}$ is the daily average temperature, $u_{7,t}$ is the precipitation amount, $u_{8,t}$ is the insolation duration and $u_{9,t}$ is the humidity.

IV. Numerical Aspects

V. Numerical Results

VI. Conclusions

References

[1] Y. Li, Y. Su, and L. Shu, "An armax model for forecasting the power output of a grid connected photovoltaic system," *Renewable Energy*, vol. 66, pp. 78–89, 2014.