

Interactive comment on “Simulation of an offshore wind farm using fluid power for centralized electricity generation” by Antonio Jarquin Laguna

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General comments

This paper is a solid simulation study of a wind farm with a hydraulic network and single generator for power take-off. The system is modeled by ordinary differential equations for the hydraulic network and the rotor dynamics, including the wind turbine controller. Aerodynamic loads on the turbines are obtained from turbulent wind fields with a one-dimensional model based on steady state torque coefficients. Wake effects in the wind farm seem to have been included using standard models. Compared to previous studies, the novelty seems to be the consideration of a complete wind farm, instead of a single turbine.

The topic is relevant, and the paper is well written. I have a few comments on improving

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aspects of the presentation, see below. Apart from that, it should be better described what the novelty is compared to earlier studies, and the conclusions should contain more information on what new knowledge we can learn from this study.

I would like to recommend the paper for publication, but have one major objection. From what I can see, the paper has been invited for the Special Issue of Wind Energy Science from the Science of Making Torque (TORQUE2016) conference. This should probably be mentioned somewhere in the paper, e.g. in a footnote. More importantly, the paper submitted here is, as far as I can tell, completely identical to the paper submitted at TORQUE2016. This is of course in conflict with policies on authorship at Wind Energy Science that ask for at least 40 percent new content. It is also ethically problematic, as it basically means twice the voluntary review and editorial effort, without any new value to the scientific community. Now, I will give the author the benefit of the doubt and will assume that he was not properly aware of these issues when asked to submit his paper for the Special Issue. Nevertheless, without additional results of interest, the paper cannot be published. One of my comments below contains a suggestion.

Specific comments

1. The paper should probably mention (e.g. in a footnote) that it is an extended and updated version of a paper previously presented at TORQUE2016 conference, and published in IOP Journal of Physics: Conference Series.
2. Continuing from the previous item, the paper needs to contain at least 40 percent new content, which is currently not the case.
3. Introduction: "This paper continues with previous work" - It would help the reader if the scope and achievements of the previous work were briefly reported. That way the research is placed more into context, and it becomes easier to evaluate what is new here.

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4. Are there any system effects when running the concept with more than one turbine? The performance and results obtained for the wind farm should be compared (in a meaningful way) with results for a single turbine.
5. The concept is based on the use of seawater. I assume that corrosion becomes an important issue then. Does the author have some comments for the readers on this?
6. As it is proposed to use only one turbine and generator, reliability of these becomes a critical issue. Has the author any thought on this that he would like to share with the readers?
7. Eqs. 6-7: The notation is slightly confusing. I assume that $V(e)$ is a function depending on the variable e , later shown in Eq. 8. However, also other terms in Eqs. 6-7 are functions that depend on parameters. To be consistent, I suggest that you simply use V in Eqs. 6-7 and clarify $V(e) = eV_{p,\max}$ in Eq. 8.
8. Section 2.1.3: The pitch actuator model is based on a proportional regulator. Why not also a derivative or integrator component? Why is the pitch actuator model needed?
9. Section 2.3: The nozzle length L_{nz} should be indicated in Figure 4 as well.
10. Section 2.4: What is the value of the vena contracta coefficient used here?
11. Section 3.1: "A low pass filter on the pressure measured is employed" - What are the filter characteristics?

Technical corrections (p=page, l=line)

- p1, l16: "and the electricity is then ..."?

- p3, l10: "defined as the ratio of the tangential velocity ..."?
- Section 4.2: "experience higher excursions of the rotor speed" - maybe change to "show larger fluctuations of the rotor speed"?

Interactive comment on Wind Energ. Sci. Discuss., doi:10.5194/wes-2016-54, 2016.

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