
Individual pitch control to damp floater vibrations: a comparison of several strategies

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Résumé

For FOWTs, the control strategy needs to consider the coupling between rotor and platform dynamics potentially leading to oscillating (not damped) steady-state or even to unstable conditions (Larsen et al., 2007). In literature, many strategies are proposed in order to design controllers well-suited for FOWTs. Among them, a family of strategies proposes to introduce a floating feedback to the platform pitch dynamics. This kind of strategies uses additional sensing, such as nacelle fore-aft acceleration measurements or platform gyroscopes to improve the pitch controller. It is introduced in (Lackner, 2009), (Abbas et al., 2022) and (Capaldo and Mella, 2023).

In this paper, we investigate three new different strategies improving the floating feedback by considering different use of the individual pitch control (IPC). Results show how IPC is able to damp platform vibrations without affecting the rotor dynamics. More test cases, including the application to an OpenFast model of a semi-sub FOWT, are under investigation. (Abbas et al., 2022) Abbas, N., Zalkind, D., Pao, L. & Wright, A.: A Reference open-source controller for fixed and floating offshore wind turbines, *Wind Energy Science*, 7, <https://doi.org/10.5194/wes-7-53-2022>, 2022. (Capaldo and Mella, 2023) Capaldo, M. & Mella: Damping analysis of floating offshore wind turbines (FOWTs): a new control strategy reducing the platform vibrations, *Wind Energ. Sci.*, 8, 1319–1339, <https://doi.org/10.5194/wes-8-1319-2023>, 2023. (Larsen et al., 2007) Larsen, T. & Hanson, T.: A method to avoid negative damped low frequent tower vibrations for a floating, pitch controlled wind turbine, *Journal of Physics: Conference Series*, 75, <https://iopscience.iop.org/article/10.1088/1742-6596/75/1/012073>, 2007. (Lackner, 2009) Lackner, M.: Controlling Platform Motions and Reducing Blade Loads for Floating Wind Turbines, *Wind Engineering*, 33, <https://doi.org/10.1260/0309-524X.33.6.5>, 2009

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