

Wind loads on an azimuthal photovoltaic platform. Experimental study

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Dimensioning of the consisting mechanical transmissions and the mechanical structure itself is an important stage in the embodiment design of a tracking system for PV platforms. The dimensioning results influence the reliability but also the costs of the tracking system. From all the loads coming from weight, wind etc., the main load is the wind load.

The differences between the values of force coefficients considered in calculus of wind load, presented by Eurocode [1] and other reference [2] and the fact that standards are not covering the case of wind loads on the platforms of tracking systems can lead to the conclusion that further research must be developed based on experimental study.

This paper is presenting the results of an experimental study developed in the Renewable Energy Laboratory from Transilvania University of Braşov. A wind tunnel type HM 170 has been used, with a reduced scale model of an azimuthal tracker. The main determination is performed with change of the tilt angle towards wind direction $\psi = 0 \dots 90^\circ$, in 10° steps, under wind velocity in the range of $v = 5 \dots 20$ m/s.

Figure 1 presents the resulted force coefficients, with corrections of wind velocity, for sequential ψ angles, depending on wind velocity. Figure 2 presents a comparison with the values recommended by [1] and [2], depending on the tilt angle.

The paper is also presenting conclusions on force coefficients that must be used in tracking platforms dimensioning and also on the value of the tangential force on tracking platforms. These results should help development of standard recommendations for the specific case of tracking systems platforms.

References

- [1] EN 1991-1-4, Eurocode 1: "Actions on structures . General actions — Part 1-4: Wind actions", 2004
- [2] J. Cabanillas, "The Wind and the Panacea of the Stow Position in the Solar Trackers", www.titantracker.es

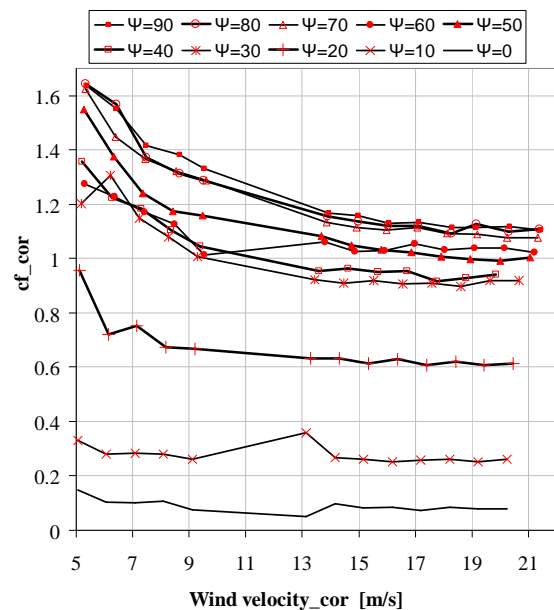


Fig. 1. Force coefficient with wind velocity correction

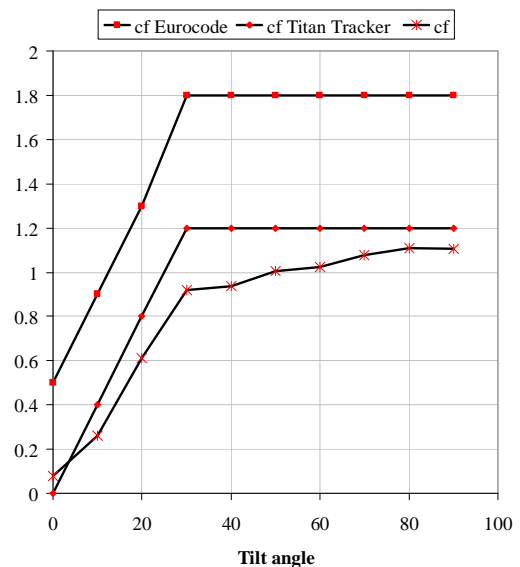


Fig. 2. Force coefficients comparison