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Local wind forecasting for Dynamic Line Rating applications

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ABSTRACT

The energy transition, with the massive connection of renewable generation to the electrical grid, makes it essential to provide greater flexibility to the entire system which allows maximizing the use of existing infrastructures. One of the techniques that have proven to be most efficient for this purpose is Dynamic Line Rating (DLR). The DLR makes it possible to adapt in real-time the transmission capacity of power lines according to the environmental conditions to which the installation is subjected. It takes advantage of the fact that the capacity of the line is not constant (depending on the ambient temperature, humidity and wind speed) and by monitoring the line it allows to increase, in certain circumstances, the flow of the line beyond its static capacity respecting the physical security criteria of the facilities and providing greater flexibility to the operation.
Wind3D is a deterministic model for wind field downscaling. It consists on a diagnostic model that allows to compute the wind velocity in a 3-D domain from punctual data arising from measurement stations or mesoscale models. This model is governed by several parameters (i.e., the terrain roughness), that change with atmospheric conditions. In this paper, this parameter estimation problem is solved by using differential evolution technique to obtain the wind velocity for DLR operation in a realistic power line.

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