actuator parameter faults in the WT. It permits the detection and localisation by means of reconstruction of pitch angle sensor fault and any fault that implies a change in the dynamics of the pitch actuator system almost instantly. The performance of this observer was evaluated and we can confirm its efficiency. Finally, further work could be the practical implementation possibilities of this strategy.

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NOMENCLATURE

β_{dt}	The torsion damping coefficient $\left[Nm/(rad/s)\right]$
B_g	Viscous friction of high-speed shaft $\left[Nm/(rad/s)\right]$
B_r	Viscous friction of low-speed shaft $\left[Nm/(rad/s)\right]$
J_g	Inertia of the high-speed shaft $\left[kgm^2\right]$
J_r	Inertia of the low-speed shaft $\left[kgm^2\right]$
K_{dt}	The torsion stiffness $\left[Nm/rad\right]$
N_g	The drive train gear ratio $\left[Nm/(rad/s)\right]$
$T_a(t)$	The aerodynamic torque $\left[Nm\right]$
$T_g(t)$	The generator torque $\left[Nm\right]$
ω_r	The rotor speed $\left[rad/s\right]$
ω_g	The generator speed $\left[rad/s\right]$
$\theta_\Delta(t)$	Torsion angle of the drive train $\left[rad\right]$

Subscripts

DSMO	Decentralized sliding mode observer
Quasi-LPV	Quasi linear parameter varying
SMO	Sliding mode observer
VSWECS	Variable speed wind energy conversion system
WECS	Wind energy conversion systems
WT	Wind turbines