Reduce platform movement

negative dampind (Recall [Review Model])

MIMO : blades pitches individually

tuned mass-damper

but expensive and complex

Better rotor speed regulation

used for tall building against wind

Goal of this paper: Proposes a state-feedback model-based predictive control to minimize the platform oscillations and rotor / generator speed regulations.

- linear state space model
- Quadratic cost function-based MPC solver compute output.

Compare with GS-PI, LQI

Inputs $\begin{bmatrix} \beta: \text{blade pitch angle} \\ \tau_g: \text{generator torque} \\ \gamma: \text{nacelle yaw} \end{bmatrix}$

The simplified non-linear model: $x' = f(x, u, V, w)$ (Inputs)

x → platform DOF and velocity

V, w → wind and wave disturbances

Linearizing Non-Linear model at X_0 in Region III (Strong wind)

$$\delta x' = A\delta x + B\delta u + B_v \delta V + B_w \delta w.$$

This control is for region III, strong wind, $P_{aero} > P_{gen}$, presence rotor / generator regulation

Generated power

$P = T_g \times \omega_g \times \eta$ ← generator efficiency

Recall physics

$W = T \cdot \theta$

$P = \frac{W}{t} = T \cdot \frac{\theta}{t} = T \cdot \omega$

Consider surge, sway, roll, pitch

[Recall in [Nova! Non-lineur], only considered surge,)

Because this control aimed to minizing platfm motion, pitch
we consider more DOFs.

MPC is a discrete-time control method

Advantages: The incorporation of input-output actuator

Avoid rapid rate of change

[In [2], they set up constraints to avoid it)