



# Statistical Approximation of Thrust Coefficient ( $C_T$ )

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**Figure 1.** Y function for pitch and stall WTs

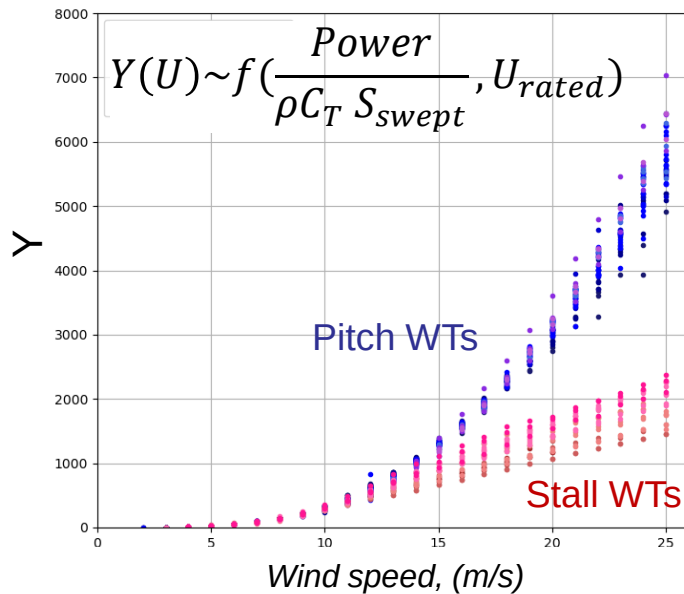


**Figure 2.** Example of actual and predicted  $C_T$

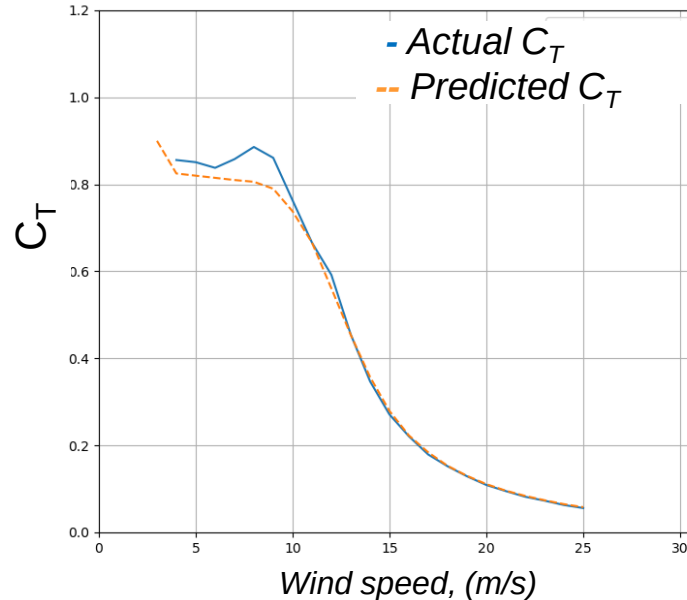
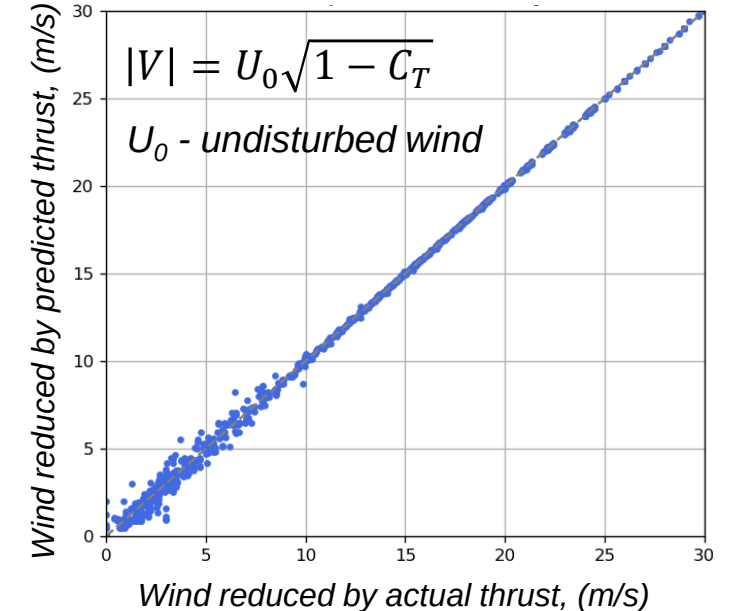


**Figure 3.** Wind speed reduced by WT



- Unlike power curves,  $C_T$  curves of Wind Turbines (WT) are scarcely available from public sources.
- Regression models for pitch- and stall-controlled WTs were made using available power and  $C_T$  curves for 72 wind turbines in total (Figure 1)
- By feeding available WT's power curve and general specifications data into Y function, the missing  $C_T$  curve can be calculated.
- Figure 2 displays a typical example of predicted  $C_T$  as compared to actual  $C_T$  for pitch-controlled wind turbine.
- Wind speed behind WT ( $|V|$ ) calculated using actual and predicted  $C_T$  for pitch-controlled WTs are depicted on Figure 3. In wind power forecast, uncertainty contribution from  $U_0$  into  $|V|$  typically is much stronger than the contribution from approximated  $C_T$ .