Dear Jason

Thank you for your answers and comments! I'm so sorry to reply late for your reply because I have lots of issues to deal with at the end of the semester in our school.

Your answers to the questions help me a lot. Under your comment and suggestions I also do some analysis on the result of fore-aft shear forces at the base of the tower(TwrBsFxt in FAST), side-to-side bending moments at the base of the tower(TwrBsMxt in FAST), platform translational surge displacements(PtfmSurge in FAST) except for the mooring line tension. The PSDs results(showed in the attachments) still puzzled me a lot. I choose the sea state(u=10m/s,hs=1m,tp=6s) for a example.

 

Figure 1 PSDs result of TwrBsFxt at whole range of frequency



 Figure 2 PSDs result of TwrBsFxt at the range of 0~0.1 frequency



Figure 3 PSDs result of TwrBsFxt at the range of 0.1~1 frequency

From the result we can see that when I set the whole frequency range, the maximum PSD value occur at the range of low frequency and the value is about 4\*10^6, which may be excitated by the surge/sway natural frequency (likely from wind, low-frequency first-order waves, difference-frequency second-order waves, or start-up transients) as you referred in the last post. But I also found that two peaks occur at the range of 0.1~1 frequency, the first peak frequency is about 0.19Hz and the second peak frequency is about 0.51Hz. Considering the wind and wave load, the wave frequency is about 1/6=0.17 Hz and the wind turbine frequency 1P=12.1/60=0.20,3P=0.60 which are almost fit the two peak frequency but the PSDs value is 9\*10^4 which is much smaller than the low peak frequency (4\*10^6).

The problems appears that the low frequency occupied a dominant position in the time domain result of TwrBsFxt from the whole range of frequency. I don’t know whether the wind and wave should be the dominant loads to cause the fore-aft shear forces and side-to-side moments or not.

The result of TwrBsMxt and PtfmSurge also have the same problems as the following figure shows.



Figure 4 PSDs result of TwrBsMxt at the whole range of frequency



Figure 5 PSDs result of TwrBsMxt at the range of 0~0.1frequency



Figure 6 PSDs result of TwrBsMxt at the range of 0.1~1frequency



Figure 7 PSDs result of PtfmSurge at the whole range of frequency



Figure 8 PSDs result of PtfmSurge at the range of 0~0.1frequency



Figure 9 PSDs result of PtfmSurge at the range of 0.1~1frequency