Exercise 4DOF:

Consider a model for the DTU 10 MW reference wind turbine with 4 DOFs:
(θ, q_1, q_2, q_3), where θ is the azimuthal position of the shaft and q_1, q_2 and q_3 the modal coordinates to describe the deflection of blade #1. Blade#2 and #3 are considered stiff

1) Include gravity loads on the blades
2) Set up the equation of motion on paper
3) Implement them in your unsteady BEM code
4) Solve for a wind speed of V=8 m/s (constant and turbulent wind)
5) Plot the tip deflections in time and frequency domain

Note that the ”old” equation for the rotational speed must be deleted and is now a direct part of the 4 DOF equation of motion