

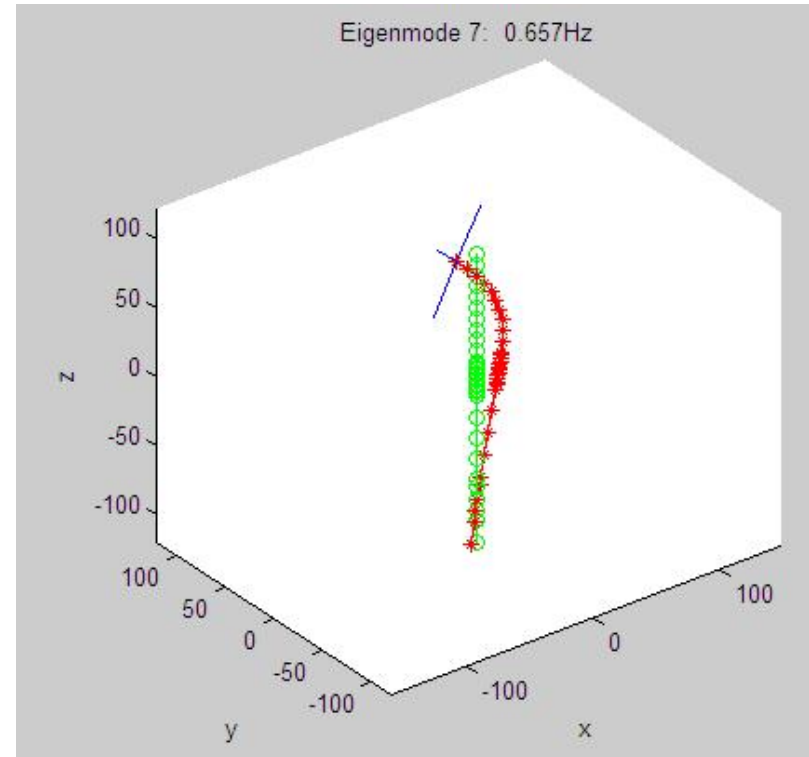
# Modelling Technique

- Modal representation of wind turbine support structure and rotor.
- In addition, there are 6 rigid body modes.
- These are constrained by hydrodynamic and mooring line forces.
- Mooring line forces implemented by definition of a 6x6 matrix of non-linear force-displacement curves.

# Integrated in GH Bladed

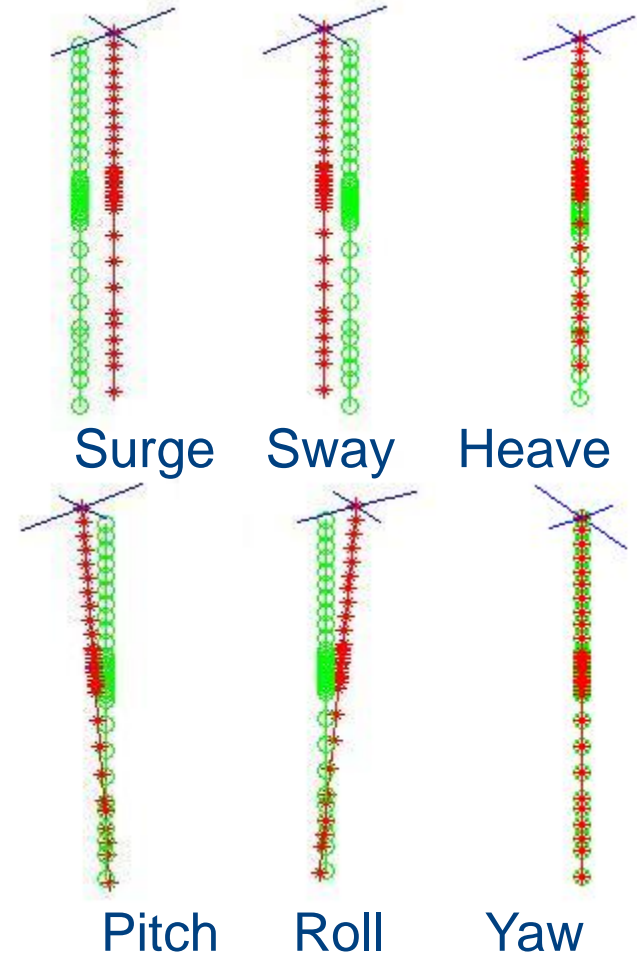
All the features of GH Bladed which have proved successful for modelling onshore and bottom mounted offshore wind turbines:

- Modal representation of tower and rotor structural dynamics.
- Validated methods for rotor aerodynamics and hydrodynamic loads.



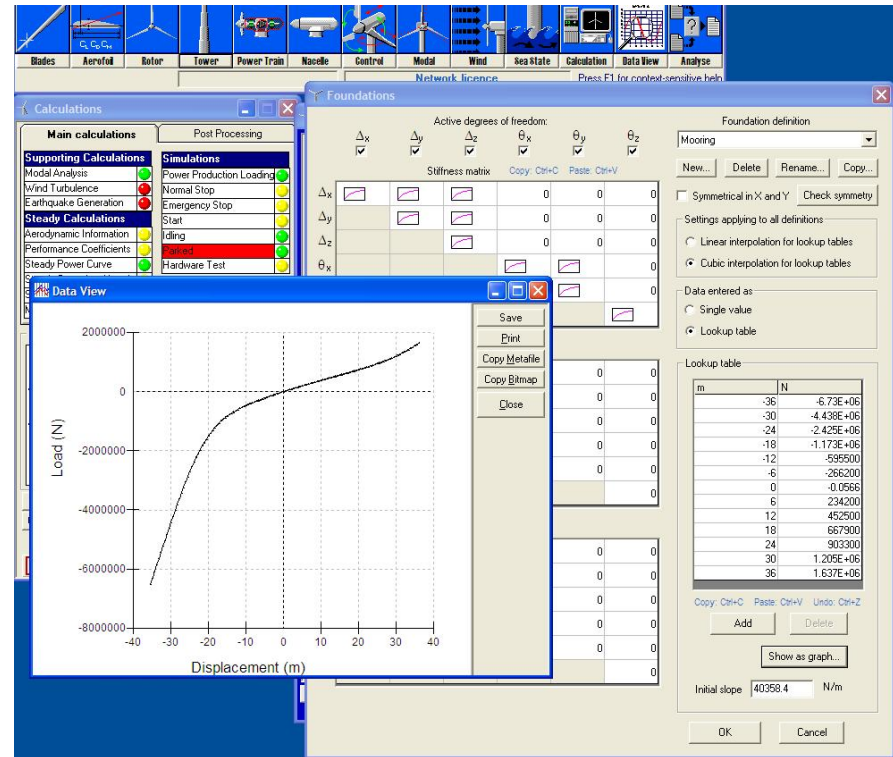
# Rigid Body Modes

- Structural modes superposed on translations and rotations of the whole structure about its centre of mass.
- Allows the modal representation to cope with large displacements.
- Mooring line forces applied as an external load rather than a modal stiffness.



# Mooring line forces

- Mooring line forces implemented by definition of a 6x6 matrix of non-linear force-displacement curves.
- Any number of sets of stiffness matrices can be defined and used at multiple locations.
- Additionally, damping and mass matrices can be defined.



# Offshore Code Comparison Collaboration

- Garrad Hassan is a leading partner in this project, coordinated by NREL under IEA Annex XXIII (Subtask 2).
- Testing the capabilities of GH Bladed against other codes including multi-body, finite element and codes coupled to specialised mooring line codes.
- Identical model and selection of load cases mean that differences due to modelling can be identified.

