Part I: Theory of LoFT

To be released soon

Section I Overview:

Section II Modelling of floating offshore wind farms

A. Low-order modelling of turbines

B. Wind farm flow dynamics
C. Ocean waves and currents
D. Grid integration

Section III Controllers

Local controller
Centralized energy management system
Centralized/Distributed wind farm flow control

Section IV Validations

Section V Conclusions and future development plan

Part II: Community Tools for Floating Wind Turbines

LoFT (**L**ow-**O**rder modelling of floating wind turbines **F**or **T**raining) draws on the work of other open-source repositories. Below we give a list of them and collect their links and key features. Hope that this list will help beginners and developers.

Table1. A list of open-source repositories for beginners in the area of floating wind turbines

Repository(link)	Key features	Main Purpose	Developers
OpenFast/Fast.Farm	Individual turbine or wind-farm model (with a limited number of wind turbines) written in Fortran; can simulate steady or turbulent inflow, regular or irregular waves; and conduct structural/fatigue analysis. The resulted are validated by scaled experiments.	Model	NREL
WEC-Sim	Wave Energy Converter Simulator (WEC-Sim), an open-source code for simulating wave energy converters. The code implementations for hydrodynamics and mooring dynamics are similar and helpful for modelling of floating wind turbines.	Model	NREL
RAFT	RAFT - Response Amplitudes of Floating Turbines, python codes for frequency-domain analysis of floating wind turbines. It presents a design-oriented modelling of floating wind turbines	Design	NREL
WISDEM	The Wind-Plant Integrated System Design and Engineering Model (WISDEM) is a set of models for assessing overall wind plant cost of energy (COE). Helpful for design and economic assessment of floating wind turbines	Design	NREL
ROSCO	Reference open-source controller that can be used in OpenFAST; when compiled, produces a libdiscon.so controller that uses a	Control	CU Boulder /NREL

	specified DISCON.IN file. The controller for floating wind turbines features floating feedback, peak saturation and detuned natural frequency.		
Floris	FLORIS is a controls-focused wind farm simulation software incorporating steady-state engineering wake models into a performance-focused Python framework.	Control	NREL
MoorPy	MoorPy is a design-oriented mooring system library for Python based around a quasi-static modeling approach.	Design	NREL
HydroChrono	HydroChrono is an emerging hydrodynamics simulation tool designed to model complex ocean systems. Seamlessly integrated with the Project Chrono physics engine, it offers a powerful C++ API for a wide range of simulations.	Model	NREL
QBlade	Built on the Project Chrono physics engine.	Model	
MOST (link1, link2)	Modelling floating turbines based on Simscape multibody.	Model	MOREnergyLab
TurboPark	TurbOPark is a parametric wake model developed by Ørsted and was validated on 19 offshore wind farms coupled with a blockage and a flow model.	Model	DTU
LoFT	Low-order modelling of floating wind turbines for reinforcement learning training.	Control	XJTU

Part III: Open-source Data Base for Floating Wind Turbines

To be released soon