On the study of dynamic mooring line damping

*Wen-Yang Hsu[1], Tzu-Ching Chuang[1], Ray-Yeng Yang[1]

1. Tainan Hydraulics Laboratory, National Cheng Kung University

A mooring system is used for station keeping of an offshore floating structure and it is applied to resist external loadings via mooring line damping. The mooring line motions are classified as quasi-static and dynamic motions. Quasi-static motion is defined as a mooring line has a catenary shape and its lower end contacts with seabed, which usually occurs in a calm weather. On the other hand, dynamic motion means the mooring line is fully lifted from the seabed and it is in a stage of semi-taut or fully taut, which usually caused by an extreme event. The goal of this project is to study the static and dynamic mooring line damping and their importance for floating structures. The property of a single-point mooring line damping will be tested in an environment with various oscillating frequencies and amplitudes of driving forces. The tension force at top-end point and its trajectory will be measured or simulated, and they are further applied
in the methodology of free decay and indicator diagram for calculating mooring line damping. These topics
will be studied experimentally and numerically. There are three stages for experiments, including the establishment of devices for measuring mooring line damping, tests for static mooring line and dynamic mooring line. The spring, rotational disc and wave flume are used as driven forces to trigger static and dynamic mooring line motions, starting from a single freedom to multiple freedoms. Two time-domain numerical models, a direct forcing immersed boundary solver for Navier-Stokes equation and OrcaFlex, will
be applied to study mooring line damping. Moreover, the drift, resonant condition, snap loads and statistical
properties for mooring line will be investigated.

Keywords: mooring system, floating structure, snap load