SIMA EXAMPLE

Turret moored FPSO

Valid from SIMA version 4.6

SIMA Example

Turret moored FPSO

Date: November 2023

Prepared by: Digital Solutions at DNV

E-mail support: software.support@dnv.com

E-mail sales: digital@dnv.com

Table of Contents

1 Introduction

The example shows how an internal turret can be modelled for single-point mooring.

The floater consists of two bodies, FPSO and Turret. FPSO is a typical SIMO-type body that can freely move in 6-DOFs. Turret is a special SIMO-type body that was designed for fixed, prescribed, or articulated structures.

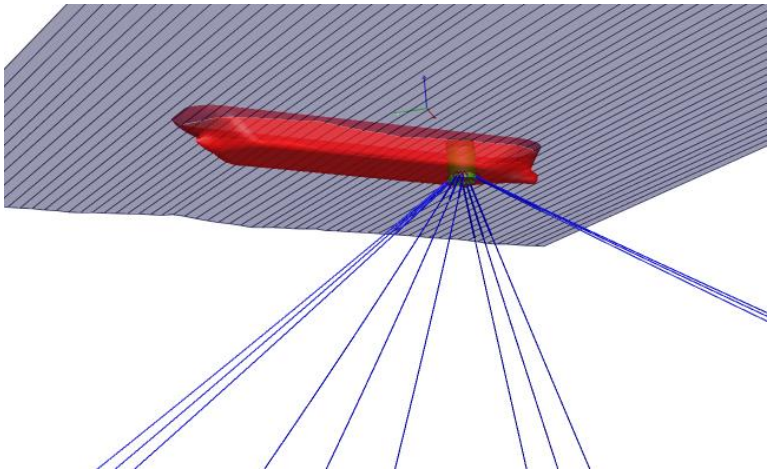

Figure 1-1 Turret moored FPSO

2 About the Model

Turret modelling can be easily achieved by using the turret type of articulated structure. Turret then will need a master body, that should be the FPSO in the example, to move following the motions of the FPSO body.

Catenary mooring lines are attached to the turret, and mooring forces are transferred to the FPSO. A Specified force is included in the Turret body to compensate the vertical downward force of the mooring lines.

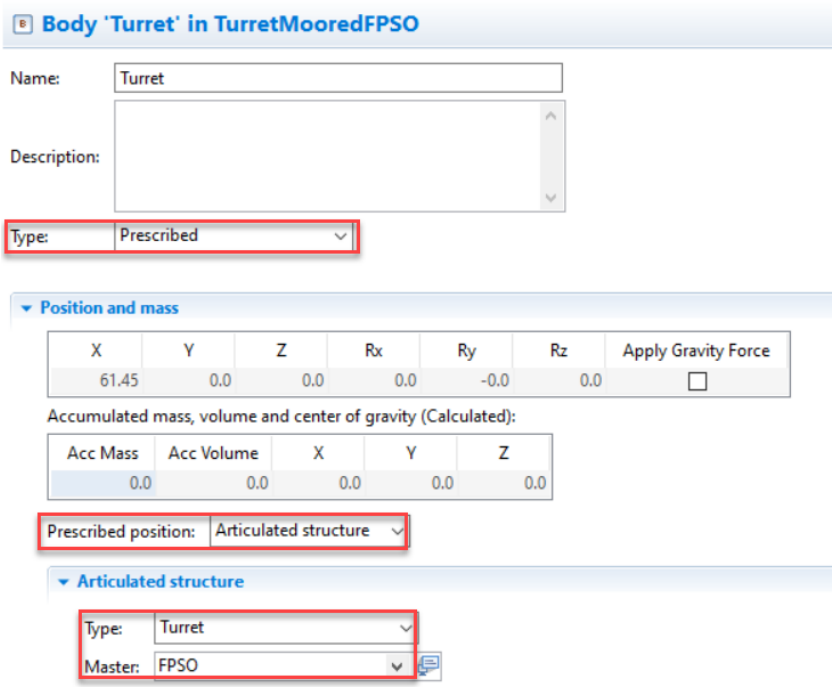

Figure 2-1 Turret model in SIMA

To show the weathervane behavior, the FPSO is located with its initial yaw angle of 0 deg. facing the north. Long-crested irregular waves come from wave direction of 135 deg., bow-quartering sea. Static analysis is intentionally set as skipped to show the performance of the turret in the example.

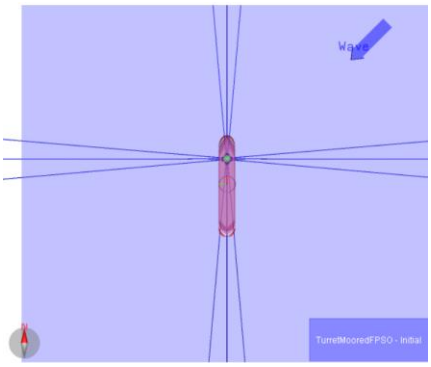

Figure 2-2 Initial condition

3 Results

In dynamic analysis, the FPSO starts to rotate and the yaw angle gets converged to 45 deg. that aligns well with the wave direction.

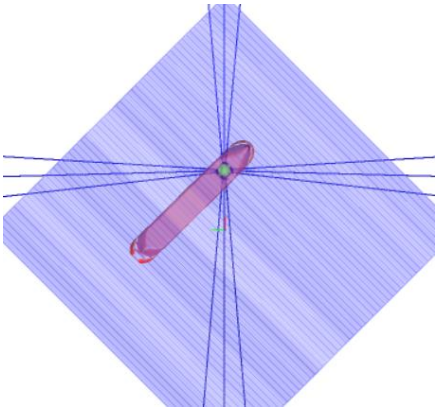

Figure 3-1 Snapshot at 10800 s. from dynamic analysis

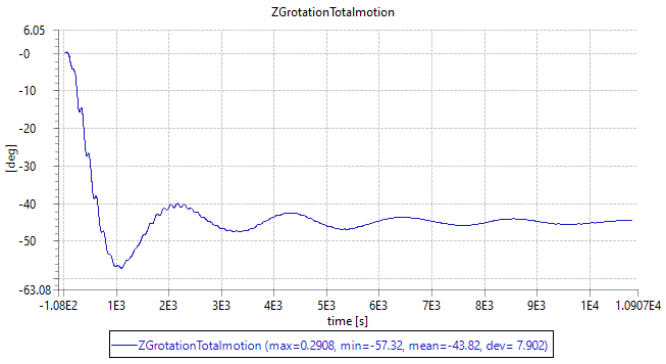

Figure 3-2 Yaw angle of FPSO

About DNV

We are the independent expert in risk management and quality assurance. Driven by our purpose, to safeguard life, property and the environment, we empower our customers and their stakeholders with facts and reliable insights so that critical decisions can be made with confidence. As a trusted voice for many of the world's most successful organizations, we use our knowledge to advance safety and performance, set industry benchmarks, and inspire and invent solutions to tackle global transformations.

Digital Solutions

DNV is a world-leading provider of digital solutions and software applications with focus on the energy, maritime and healthcare markets. Our solutions are used worldwide to manage risk and performance for wind turbines, electric grids, pipelines, processing plants, offshore structures, ships, and more. Supported by our domain knowledge and Veracity assurance platform, we enable companies to digitize and manage business critical activities in a sustainable, cost-efficient, safe and secure way.