MOOROPT-2 - A MIMOSA TOOLBOX program
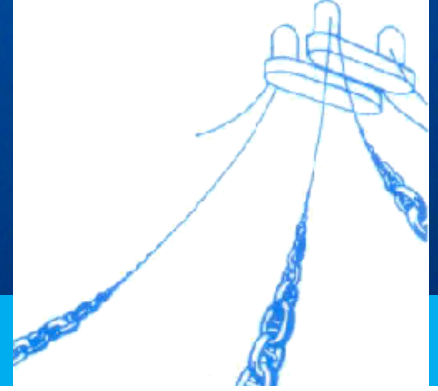
Performs costs minimization of mooring and riser line systems. Variables may be; line segment length, diameter, pre-tension or distance to anchor, buoyancy, line direction. Constraints to be satisfied may be; safety factor requirements for maximum and minimum tension, curvature radius, line angle at seabed, offset.

Purpose

MOOROPT-2 is a toolbox program for MIMOSA. The purpose of the program is to find values of design variables that give minimum system cost while satisfying a specified set of constraints.

The program carries out conceptual design of both mooring lines and riser lines. Analysis methods are limited to the ones available in MIMOSA. In practice this means that for riser lines with buoyancy, only quasi-static analysis can be selected with the present version, and the influence of bending stiffness is neglected. This can to some extent be accounted for when specifying tension constraints and curvature radius constraints.

Cost parameters

- Mooring lines
- Cost per kg for mooring line segments
- Riser lines

Two cost specification alternatives:

1. Riser cost as function of maximum offset, linear and nonlinear term
2. Cost per m of riser line material plus cost per kg of buoyancy material

Design variables

One can select one or more of the following design parameters as variables:

1. Line direction
2. Line pretension or distance to anchor
3. Segment length
4. Segment diameter for mooring line segments
5. Submerged weight (buoyancy volume) for riser line segments

Net force of concentrated loads (buoys or clump weights)

Constraints

One or more of the following ten constraints are allowed:

1. Safety factors in mooring line segments
2. Tension minima in mooring line segments
3. Fatigue life in mooring lines
4. Distances to structures and crossing lines
5. Mooring line slope at anchor, range
6. Tension maxima, riser line segments
7. Minimum curvature radius, riser line segments
8. Riser slope at lower end, maxima
9. Riser slope range at lower end
10. Maximum offset of specified point on vessel.

References and further information:

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