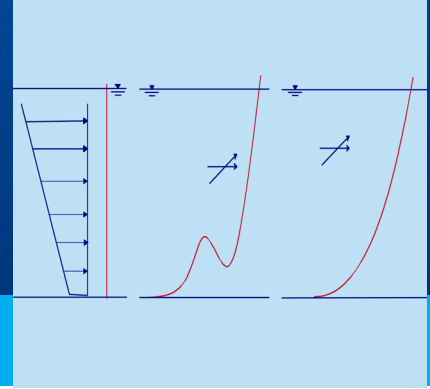


MARINTEK FACT SHEET

VIVANA



VIVANA - Calculation of vortex induced vibrations of slender marine structures

VIVANA is a computer tool for calculation of vortex induced vibrations (VIV) of slender marine structures such as risers, free span pipelines and cables subjected to ocean current. This response type may in many cases be decisive for the design and operation of marine systems.

Program description

Depending on the length of the structure and cross section and current velocity variations, one may experience single- or multi-frequency response.

VIVANA is able to handle both response types, but is at present limited to compute vibrations orthogonal to the current velocity. Hence, in-line VIV is not considered.

Method

The hydrodynamic model in VIVANA is based on empirical coefficients, while the structural model applies a non-linear 3-dimensional finite element formulation. The program is able to work with an arbitrary distribution of tension, mass, stiffness, buoyancy and diameter. Response frequencies are identified while considering a frequency dependent hydrodynamic mass along the structure. Response amplitudes are calculated at the discrete frequencies by the frequency response method.

The excitation force model includes a lift coefficient that is

a function of the response amplitude and the response frequency. Damping outside the excitation zone is introduced by high and low velocity damping terms.

Program capabilities

Examples of riser systems that can be analysed by VIVANA are shown in the figure above.

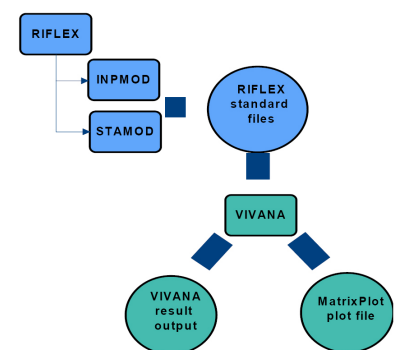
Important VIV properties handled by VIVANA are:

- Free variation of all parameters (diameter, Strouhal number, coefficients etc.) along the riser
- Frequency dependent hydrodynamic mass matrix
- Identification of dominating and possible response frequencies
- Identification of excitation and damping zones for all response frequencies
- Calculation of response amplitude
- Calculation of fatigue damage
- Calculation of drag amplification

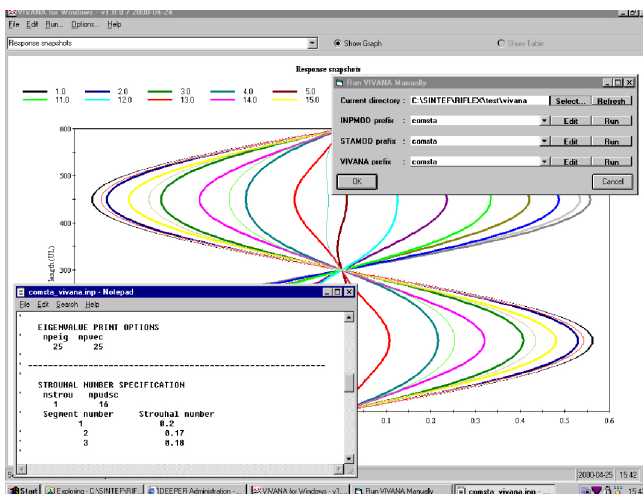
Functionality

The VIVANA program system currently includes the following functionality:

- RIFLEX INPMOD: Reads riser model data from a user defined input file.
- RIFLEX STAMOD: Calculates the static equilibrium condition for the riser
- VIVANA: Main VIV module; computes VIV response, fatigue damage and drag amplification



A complete user interface for VIVANA does not exist at present, but a Windows based environment for running the various modules and viewing result plots is available.



VIVANA is developed and maintained by MARINTEK,
- marketing and sale is handled by DNV Software Sesam.