Orcina
Professional software for engineering professionals
Newsletter
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OrcaFlex 9.8 (Oct-14)

now with all you need for Pipelay analysis …

Because of delays, our last newsletter covered both the 9.6 and 9.7 OrcaFlex releases. Here we're attempting (again!) to revert to the norm, and this newsletter accompanies v9.8 of OrcaFlex which was released October 2014.

The major new capability released this time in OrcaFlex is the **Supports** feature which makes it much easier to build **pipelay models**. As well as being introduced below, Supports are also the subject of the centre spread in this issue. And in other developments:

- There are some new optimisations to the way **wave particle kinematics** are performed, offering the potential for much improved run times in certain cases.
- The **slam model** has been extended to allow added mass coefficient to vary with proximity to the free surface.
- **Line Contact** has been improved to handle very closely fitting lines.
- The **Separate Buoy and Line Statics** method has been removed.
- OrcaFlex has been upgraded to support the latest version of **VIVA**.
- **User-defined loads** can act directly on **Lines**.
- There are some enhancements to **Vessels** (not least the ability to run 3DoF in implicit).
- We've added a new result for **autocorrelation**.

As always, a full list of the new features can be found in the What's New section of the OrcaFlex help menu and also on our website at: www.orcina.com/Support/OrcaFlex/.

We always welcome suggestions for improvements and / or future content so please do drop us a line.

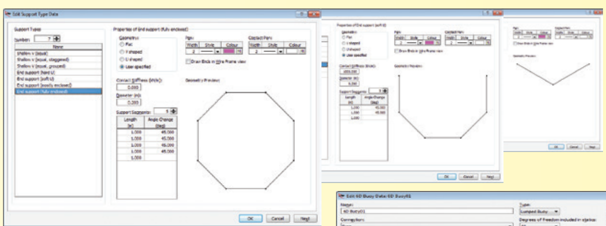
In this newsletter:

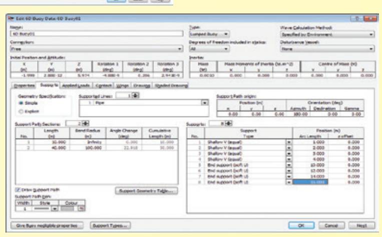
Pipelay now much easier in OrcaFlex

New dedicated UI to make model set up a breeze.....

Simulating static and dynamic pipelay operations in OrcaFlex has been possible for years. However, it has been dogged by two main drawbacks: the building and placement of roller boxes was not that intuitive, and special measures were needed to get a static solution with Lines above the rollers. But now v9.8 brings major new enhancements which fully address both these difficulties…

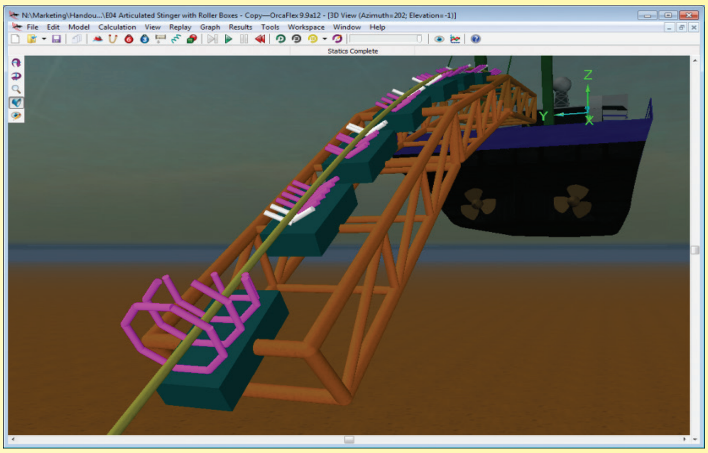
First up is the new **Supports** user interface - see screenshot below. This is specifically aimed at making roller definition and placement really quick and easy.





Examples of different roller box configurations are shown above and how these are 'placed' in the model is shown to the right.

Secondly we've **developed the static solution procedures in OrcaFlex** so now the pipeline 'knows', without further measures, that it is supposed to sit on top of the defined Supports (rollers). So no need for extra winches, links, shapes, etc., to bring the line into position. The ease with which statics solves these cases can't be shown in a static screenshot - you'll just have to



believe us and then try it yourself!

And in other 'pipelay news' – (i) limited comparisons between OrcaFlex and OFFPIPE show excellent agreement, and (ii) we've published two approaches to lay-table post-processing - see the main article for more on both of these.

It's worth noting that the new Supports feature is just the latest feature we've added to help pipelay analysis. OrcaFlex already has built-in code checks, explicit pipe-in-pipe and piggy-back modelling and equivalent line setup.

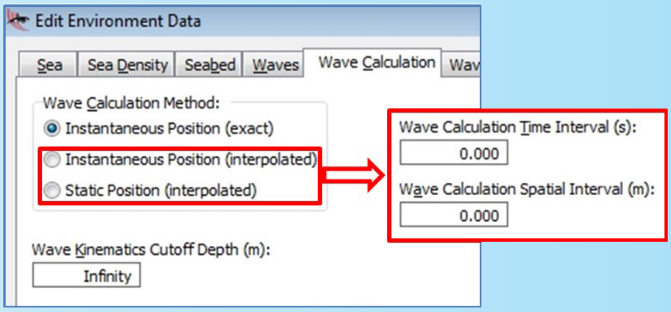
Finally in this very brief introduction, we should say that Supports are actually completely generic and can be used for a wide range of non-pipelay applications – the main article in the middle of this newsletter points to some of these and provides a more detailed description of Supports in a pipelay context. Happy reading and please let us have your feedback.

Wave kinematics runtime optimisations

Faster run times for irregular waves…

The computation of wave particle kinematics for irregular seas (modelled as a sum of linear components) involves expensive trigonometric and hyperbolic calculations, significantly increasing run times with many wave components. For previous versions of OrcaFlex a general rule for models dominated by nodes is that computing wave kinematics comprises 1/2 the total effort with 200 components and 2/3rds of the effort with 400 components. So any optimisations in this area should give significant run time improvement!

Previously, OrcaFlex wave kinematics were computed 'exactly' for each rigid body (Line nodes or Buoys), at every time step. But v9.8 now offers the following Wave Calculation optimisations:

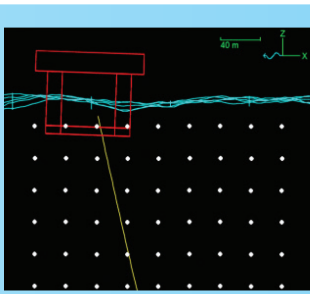


Instantaneous Position (exact)

This default setting is simply what OrcaFlex did before – wave kinematics at every time step at every point in the model.

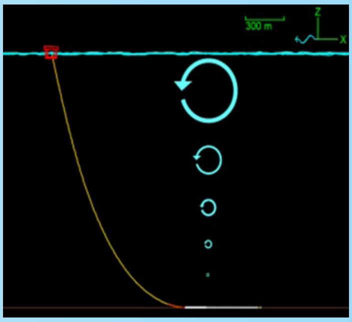
Instantaneous Position (interpolated)

Here wave kinematics are computed on a regular grid in both space (see right) and time. Kinematics at other points are interpolated on this grid. The new data items Wave Calculation Time Interval and Wave Calculation Spatial Interval define the grid density.



Static Position (interpolated)

Here the spatial grid corresponds to the Line node positions in their static configuration. Kinematic re-calculation with time assumes these calculation points remain fixed even though the nodes will move with dynamic excitation. With this method, Wave Calculation Time Interval is the time between wave kinematic updates (interpolation being used at intermediate 'structural' time steps) and Wave Calculation Spatial Interval reduces the spatial grid further (still on the line's static position), interpolating at Line nodes for the wave kinematics.



Wave Kinematics Cutoff Depth

And finally, because wave kinematics decay rapidly with depth, most Line nodes in 'deep' water probably see negligible wave kinematics. So Wave Kinematics Cut-off Depth can be used with any of the above methods, to set a depth below which wave kinematics are not computed. This is the simplest and most effective way to increase efficiency.

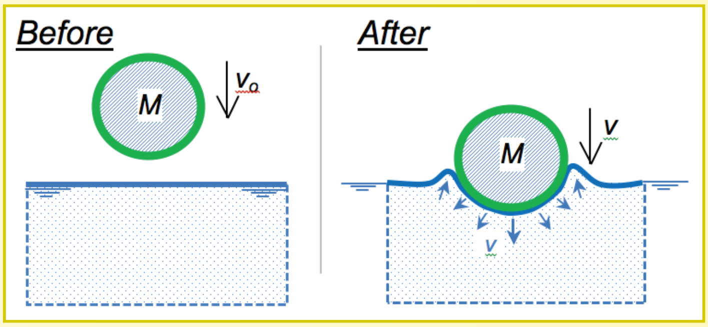
Sensitivity

Although these efficiency gains are attractive, sensitivity studies are needed to ensure any optimisations do not unduly influence the results.

Slam Model Improvements

More slamming…..now with variable added mass!

V9.5 added slam modelling on 6D Buoys, assuming that the added mass coefficient remained constant. In this release, the OrcaFlex slam model now *allows for variable added mass coefficients with submergence*…. but first, some background:



A cylinder *(mass M)* approaching flat water with a velocity, v_o, (see above) has a momentum of $M.v_o$. On penetrating the water, the momentum is then $(M + m_a)v$, where m_a and v are the mass and velocity of the moving fluid particles[1]. Conservation of momentum gives $M.v_o = (M + m_a)v$ and the force exerted is equal to the rate of change of momentum (Newton's second law):

$$\frac{d(M.v_o)}{dt} = \frac{d(M + m_a).\, v}{dt} = (M + m_a)a + v.\frac{dm_a}{dt}$$

$(M + m_a)a$ is the normal inertial term which OrcaFlex always applies, and $v.(dm_a/dt)$ is the 'extra' load due to slamming. So slam force is proportional to the rate of change of added mass.

In turn m_a depends on the progressive immersion *(h)* of the cylinder in two ways: (i) the immersed volume $(P_w(t).V)$, and (ii) the added mass coefficients $(C_a(h))$. Previously OrcaFlex slamming only included the first term (via user-defined slam coefficients and associated areas). However, OrcaFlex now includes both terms by asking for tables of C_a *vs. h* and *the rate of change of* C_a *vs. h* - and it's this second table which gives rise to the slamming force. Note that both the old and new approaches follow section 3.2.9 of DNV RP H103.

	OrcaFlex (9.5 to 9.7)	OrcaFlex (9.8 -)
$m_a =$	$C_a.\rho.P_w(t).V$	$C_a(h).\rho.P_w(t).v$

Here we've used a simplified exemplar, but the slamming implementation in OrcaFlex is generalised (as it was before) to allow for: water entry and exit, ramping slam force to avoid numerical instability and arbitrary object orientations to the water level (including wave slope).

Having been asked for this change to the slamming calculations for a little while now, we hope this meets with approval 😌. In a subsequent phase we plan to add slamming calculations directly on Lines.

[1] Newman states: "The added mass can be interpreted as a particular volume of fluid particles that are accelerated with the body. Strictly, however, the particles of fluid adjacent to the body will accelerate to varying degrees, depending on their position relative to the body. In principle every fluid particle will accelerate to some extent as the body moves, and the added mass is a weighted integration of this entire mass."

Enhancements to the Line Contact Model

Here are two 'specialised' enhancements …..

The Line Contact model came out in v9.6. It was originally motivated by the desire for better pipe-in-pipe modelling, but also allows large-scale relative movement (with or without friction) for a wide range of applications – pipe-in-pipe, piggy-back lines, J-tube pulls, explicit bend stiffener modelling, riser towers, guide tubes, etc, etc.

We found, however, that there were certain situations where the model did not perform well, and we describe here what we've done to fix that:

Penetrator discretisation

OrcaFlex can have numerical problems when the outer diameter of the inner line is very similar to the inner diameter of the outer line - eg, a centralised pipe where the centralisers are an interference fit with the outer pipe.

The direction of the Line Contact's reaction force is defined by the line that passes through the two points of closest approach – see top right. With two significantly different lines the reaction direction is well defined.

But if the contact diameters are very similar (mid picture on right) the reaction force direction is still well-defined, but it's very sensitive to small changes in position of either line. Ultimately, for a 'perfect fit', the direction is ill-defined and the contact force model is singular. This can lead to noisy or unstable simulations.

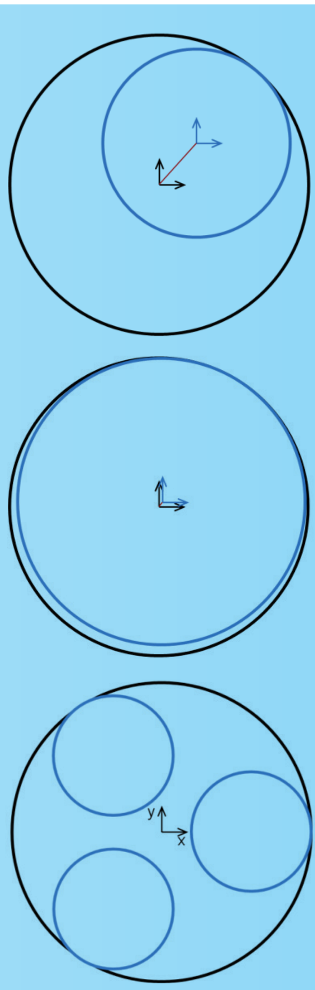
To address this issue a new feature, Penetrator Discretisation, has been introduced to allow the original penetrator to be discretised into multiple smaller penetrators. The user is now asked to specify how many discretised penetrators are to be used, and their scale relative to the un-discretised penetrator. The discretised penetrators are then evenly distributed as can be seen in the lower figure (Count=3, Scale=0.4).

Discretising in this way recovers well-defined reaction directions (now for each discretised penetrator), and consequently interference-fit contact can be modelled without any problems.

Torsion modelling for Line Contact Splined Lines

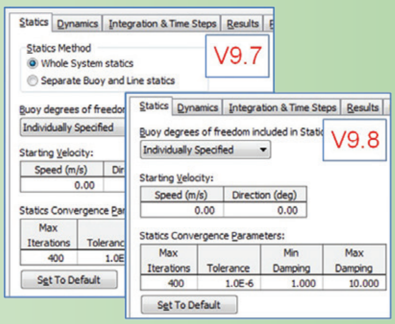
Previously, Line Contact required the 'splined line' to have torsion enabled. Torsion is modelled perfectly well by OrcaFlex, but there are a couple of consequences of enabling it: (i) simulation times including torsion are slower than non-torsion models (as the number of Degrees of Freedom are doubled), and (ii) statics convergence for Line Contact is sometimes harder.

One of the by-products of the Supports development (described elsewhere herein) is that we were able to relax the need for torsion to be included in the Line Contact model. So, for cases where friction between lines is not needed, torsion can be turned off improving both statics convergence and simulation times.



Separate Buoy and Line Statics Removed

Sees the departure of an old friend…



Since the inception of OrcaFlex, the statics solution method was what became known as the *Separate Buoy and Line Statics method.* Those of you who can remember that far back may recall 'happy'(!) times trying to get statics to converge. V9.0 of OrcaFlex added a second statics solution method (and this is when we invented a name for the first!) called *Whole System Statics.*

Whole System Statics was generally better than *Separate Buoy and Line Statics* and so became the default. But we retained *Separate Buoy and Line Statics* for rare models not initially supported by *Whole System Statics.*

Since then *Whole System Statics* has been improved – so much so that we have no cases where it is not the best option! Consequently *Separate Buoy and Line Statics* has been rendered obsolete and so, with the advent of v9.8, we say farewell to it!

(A minor aside, the *Step 2 Statics Method (Full Statics)* for Lines could only be set to None when the *Separate Buoy and Line Statics* method was used. This is not normally recommended, but in certain unusual situations it's useful. But with the demise of *Separate Buoy and Line Statics,* we've extended *Whole System Statics* to also allow the user to set Step 2 to None.)

OrcaFlex - VIVA Interface Improved

The OrcaFlex VIVA interface is now more like the OrcaFlex Shear7 interface…

Previously OrcaFlex interfaced with a VIVA DLL. This was fine at the time of development, but unfortunately VIVA's DLL was not updated as the VIVA program itself was developed. So now v9.8 of OrcaFlex has a direct link with the VIVA executable instead – in almost exactly the same way as OrcaFlex has interfaced with Shear7 for years. The advantages of this change are:

- Modern VIVA can be used, and the interface is easier to update.
- VIVA can be accessed from 64-bit OrcaFlex.
- VIVA can use OrcaFlex modal results (previously VIVA did the modal analysis).
- VIVA still requires a uniform discretisation, but the need for OrcaFlex to do the same is now removed - OrcaFlex does this by interpolating the input data supplied to VIVA.
- OrcaFlex now captures the VIVA output files for saving and summarising.

So after all the great news here's the glitch - at the time of writing (Jan-15), the version of VIVA that OrcaFlex requires has not been publically released (we used a beta release of VIVA). Please contact JD Marine to obtain a version of VIVA compatible with this version of OrcaFlex.

The new OrcaFlex Pipelay User Interface (aka 'Supports')

OrcaFlex has been used for many years to model S-lay. There are, however, some (fair) criticisms about this, specifically that:

i) None of the existing OrcaFlex contact models (see below) are ideal for pipelay, as they all require special measures to get the pipeline above the stinger.

ii) Building and positioning roller boxes is not intuitive. Not a problem if you had a clear head and a good grasp of OrcaFlex - but not trivial for the rest of us 😉 !

OK, so what could be done to address these concerns…? Well it's been a long time coming, but the result is the new OrcaFlex Supports feature – something we feel confident is a major advancement for OrcaFlex.

Firstly, lets note the rather non-descript name (especially for pipelay) for this feature, ie., 'Supports'. We chose this because the functionality has wider uses (see below) than just pipelay, but here we concentrate on pipelay applications.

Modelling Contact (in general)

OrcaFlex already has several contact models: Elastic seabed, Elastic solids, Line Clashing and Line Contact. They're all a little different having, over the years, been derived for different reasons, but each well suited to their application. The note www.orcina.com/Resources/TechNotes/ModellingContact.pdf summarises the pros and cons and typical applications of these contact models. All of them (except the seabed model!) have been used for pipelay contact, but they need careful use.

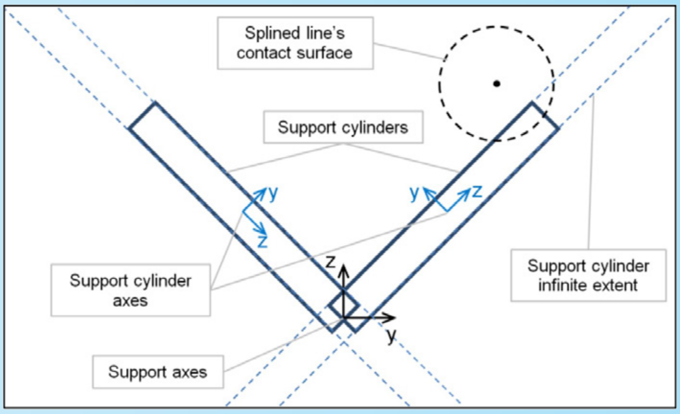
Modelling Contact (though Supports)

The new Supports feature adds yet another contact model, but one which is ideally suited to pipelay applications. To achieve this, there have been three main technical developments:

i) The Line Contact model (cf. OrcaFlex v9.6) allows contact between spheres and cylinders. The Supports development extends this to allow contact between one cylinder (eg., the pipe) and another cylinder (eg., the roller(s)).

ii) We've also removed the need to have torsion enabled for Line Contact, and the Supports development therefore also inherits this.This improves static convergence.

iii) And finally, Supports have a preferred side ie., 'above' and not 'below', as dictated by the Support's y-axis (see diagram). This is the long-vaunted 'intelligent roller' you may have heard us mention in the past. It means OrcaFlex now really does easily solve statics in these cases.



There is much more information on all these technical developments at www.orcina.com, in the OrcaFlex help file, blog and UGM notes. But that's as much as we'll say here.

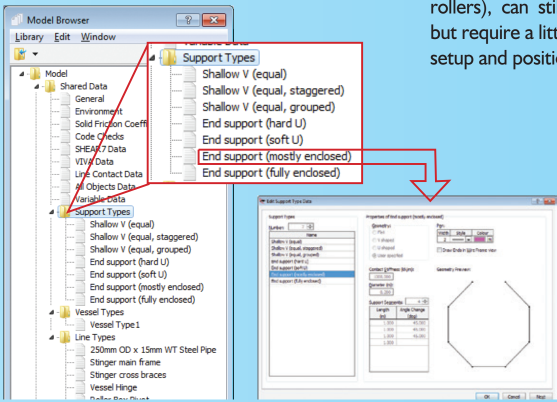
Whist these developments are fundamental to the success of modelling pipelay in OrcaFlex, they are not directly visible to the user. However, the next section describes the new Supports UI which perfectly complements the technical side….

Supports

In summary the new Supports UI makes building the roller boxes and easily positioning them correctly on the vessel and stinger very much easier than before. Expanding on this:

Building the roller box (support)

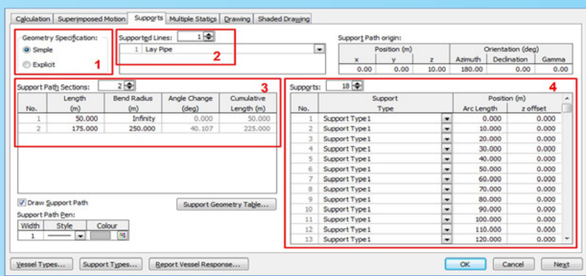
Supports are modelled through Support Types. These are identical in concept and use to Line Types and Vessel Types (so should be very familiar) and are listed in the Model Browser in the same way (see screenshot). Most of this is pretty self-explanatory – there are a number of standard geometries and a user-defined option. All supports (eg., rollers) are assumed to be symmetrical. Non-symmetrical supports (eg., staggered 'V' rollers), can still be modelled, but require a little more care to setup and position.



By way of an introduction, there's really not much more to it, other than to say that setting up rollers is now super easy and very quick!

Placing the roller box (support)

Now we have a set of Support Types, they need to be placed on the vessel / stinger – all done through a new page called Supports. The screenshot below shows this page from the Vessel data form, but they're the same on the Buoy data form. Having Supports on both Vessels and 6D Buoys allows pivoting roller boxes and both hinged and articulated stingers.

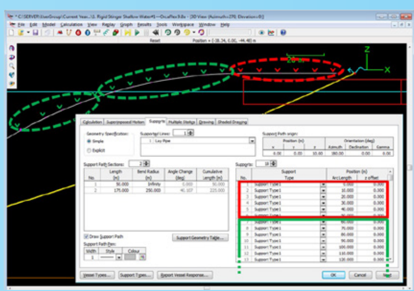


There's a lot in the above screenshot and it's not all going to get discussed here – the OrcaFlex Help File has all the details. But we are going to talk through the main parts: Firstly, which UI is seen depends on which of the two ***Geometry Specification*** options are chosen (highlight 1). This is discussed a little more below, but common to both are the ***Supported Lines*** data (highlight 2). This specifies which other Lines in the model interact with the Supports - it's the Supports equivalent of Relationships for the Line Contact.

Geometry Specification = Simple

This choice allows a 'simple' way to set Support positions:

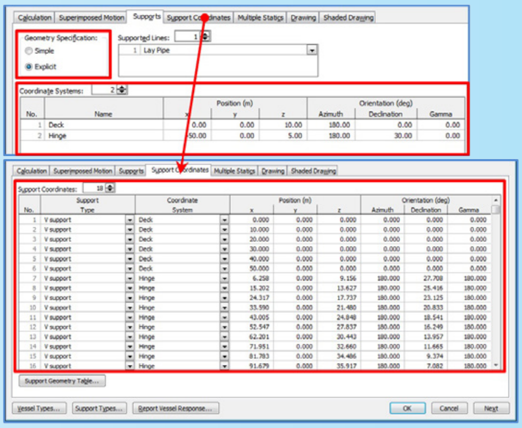
Support Path Sections (highlight 3) allows the path of the supported pipe to be defined as successive sections, each with different length and curvature. The screenshot shows two sections: 50m flat (infinite bend radius) and 175m with a defined curve.



The new OrcaFlex Pipelay User Interface (aka 'Supports')

Supports (highlight 4) is where the Support Types are placed at various arc lengths along the Support Path. The first six supports are in the first 50m and hence are on the flat support path at the vessel stern. The remaining supports are all located at arc lengths on the second, curved, support path section (see screenshot to the right).

Geometry Specification = Explicit
This option (see screenshot below) allows the user full control over the positions and orientations of individual supports as they are defined relative to a user specified coordinate system. Indeed several coordinate systems can be defined allowing supports to be grouped and conveniently manipulated.



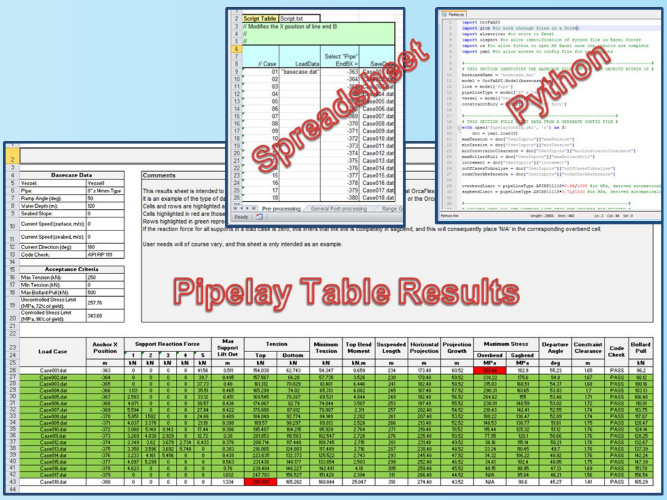
OrcaFlex and OFFPIPE

Whilst OrcaFlex calculations are well proven, we were naturally curious to see how OFFPIPE and OrcaFlex compared. To this end we managed a limited comparison which showed generally excellent agreement between the programs for both static and dynamic calculations. Unfortunately there is not much more that we can say about this, although we are attempting a more detailed comparison.

In doing this we learned a lot. So we are much better placed to help clients transition to OrcaFlex for pipelay applications – just contact us and we're ready to assist with model building and results interpretation.

Automation and Lay-tables

So, with all this new capability, what about 'lay tables'? Well, it's all done through the existing automation facilities shipped as standard with OrcaFlex. The screenshot shows two approaches we've implemented to show how it can be done – one through the standard *OrcaFlex spreadsheet* and the other done programmatically using some *python code* (these files are now distributed as standard examples). With the Spreadsheet approach you have to consider a range of laybacks to encompass both the min and max possible laybacks. The python approach is more robust and automatically looks for the min and max laybacks for you, and then automatically steps between these!



Future Enhancements

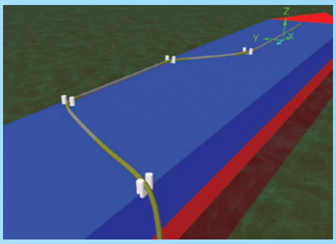
For pipelay the latest customer release (OrcaFlex v9.8c) includes a new results variable, **'Max pipelay von Mises Strain'**, which is an equivalent strain measure commonly used in S-lay, and a **contact pen colour** can now be specified for Support types. Another more general feature, also useful in pipelay, is that **static results** are separately available as well as the normal dynamic results.

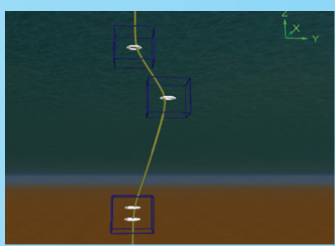
Future enhancements we hope to make include simpler modelling of articulated rollers and better handling of concrete-coated pipes and field joints….though whether these, and other feature thoughts, make the cut, largely depends on the level of user feedback!

Other Applications of Supports

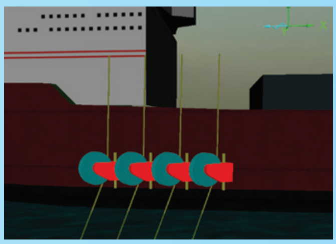
So what about the other applications of Supports we alluded to earlier? Well, Supports can be used for pretty much any application where a Line's configuration is controlled by 'guides', ie., where its path is not that due to line weight, buoyancy and stiffness alone. Some other applications are shown below (but there are many others…):

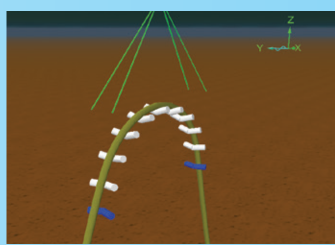
Bollards & sheaves:





Other 'guides'





Conclusion

So, there you have it – a long anticipated development for OrcaFlex is finally here. We hope that it fulfils the needs of the pipelay community, and others, as well as we're expecting it to 😃.

User Defined Loads Directly on Lines

User-defined Applied Loads directly to an OrcaFlex Line…

Occasionally it's handy to be able to admit user-defined loads (ie. loads in addition to the usual gravity, buoyancy, fluid loading and contact) directly onto a line. This would be useful when alternative aero- or hydro-dynamic fluid load models (eg., through CFD) might be required, for the programmatic modelling of non-linear lateral soil resistance, emulating the effect of an object connected to a line, etc, etc.

In earlier versions of OrcaFlex this could be done by attaching 'negligible' 6D Buoys to the Line and admitting these loads via the Buoy's Applied Loads page. This workaround always felt a little 'messy' and inconvenient and required torsion to be enabled for the line, even if you were only applying forces but no moments!

But now, user-defined applied loads can be specified directly on a Line via the new Applied Loads page. This is much more obvious and less convoluted, and there is also now no need to have torsion on when the loads are just forces (but to include moments on the line, then clearly torsion has to be enabled!). Hope that this is useful for those that need it.

Low Level Solver Improvements

Abstract, not 'visible', but a giant step for OrcaFlex allowing great things in the future…

An activity that we've struggled to find time for over the years has been to re-work the low level solver code in OrcaFlex. There are various aspects of the original implementation which are currently constraining some features we'd like to add to OrcaFlex, for example:

- Simplify testing and development by using the same solver for both implicit and explicit integration (implicit integration, full statics and whole system statics are handled together, but explicit integration uses different code pre-dating the advent of the implicit solver).
- Solve frequency domain problems.
- Solve non-spatial degrees of freedom, for instance the wake oscillator degree of freedom (the current implicit solver cannot do this and so wake oscillators are limited to explicit integration).
- Allow 3DoF vessels to solve in the implicit solver.
- Handle more general constraints. For example, to be able to suppress individual degrees of freedom, not restricted to degrees of freedom with respect to the global axes directions.

Well, we've finally managed to get around to re-working the solver - and this is in v9.8. But apart from one feature (see Vessels article below), we've not had the time to realise any of the above goals. However, the code foundations have been successfully re-worked and fully tested, so we're now well placed to tackle the above goals in the future.

Various Vessel Improvements

Some new revisions to the Vessel object in OrcaFlex…

3DoF vessels allowed with implicit integration: The new solver mentioned above now allows 3DoF Vessel Calculated Primary Motion to be used with the implicit integrator. Previously this could only be used with the explicit integrator, often resulting in slower-than-necessary run times for horizontal plane motions. Somewhat confusingly the 'apparently more complicated' 6DoF Vessel Calculated Primary Motion option has always been possible to run with implicit. We hope this one proves useful to all those who have asked for it over the years.

WAMIT import: WAMIT QTF data are calculated in two ways - pressure Integration (or near field) and momentum conservation (or far field). When we developed the WAMIT import capabilities in OrcaFlex we took the view that only importing data from by the Pressure integration method was needed. However, a steady trickle of client feedback asking for import also from the WAMIT Momentum Method, persuaded us that we should add this……and so it is now implemented.

Vessel weight & buoyancy: OrcaFlex can now apply vessel weight at the vessel's centre of gravity and buoyancy forces directly at the vessel's centre of buoyancy. Previously these effects were included in the hydrostatic stiffness matrix (and the resultant load was applied at the stiffness and inertial damping reference origin). Now by applying the forces explicitly we fully capture the non-linearity of the moment arm contribution, whereas wrapping this all up in the hydrostatic stiffness matrix, as we did before, is only a linearised approximation. Note that the hydrostatic stiffness matrix is still needed to account for the 'pure' hydrostatic stiffness due to waterplane area.

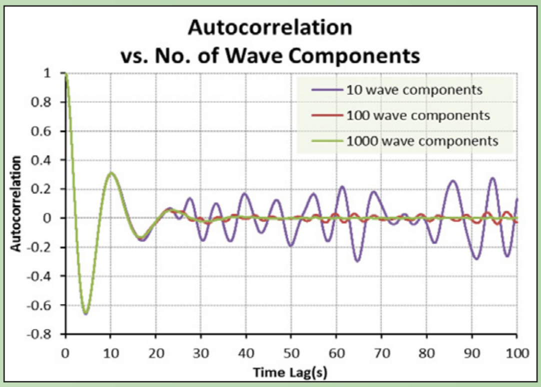
Autocorrelation

How correlated is your signal?…

In OrcaFlex we are used to discretising the structure (eg., the Line) and time, but if we use irregular waves then we also discretise the wave spectrum. And, as with the space and time discretisations, if the wave spectrum discretisation is poor (through having too few regular wave components) it may give misleading results. But conversely, using too many components may mean unnecessarily long simulations.

To help decide on the appropriate number of wave components, v9.8 introduces the Autocorrelation 'result' for the wave elevation (on the Waves Preview page). This tells us how correlated the current value is with successive past (lagged) values. Greater time lags show less correlation – for real surface waves the autocorrelation decays from 1 to very small values in a few wave periods. But the autocorrelation for a discretised spectrum typically shows more significant correlation at longer time lags, due to the presence of a finite number of wave components.

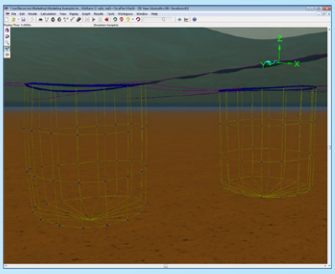
So, in discretising the wave spectrum, the aim is to specify enough wave components such that the autocorrelation not only decays to a reasonably small value, but that it stays small for the duration of the simulation. An illustration of how the number of wave components can affect the autocorrelation is shown in the screenshot. Hope this is useful!



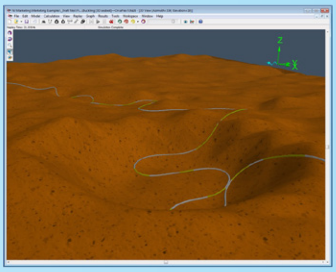
Applications and Agents

Applications

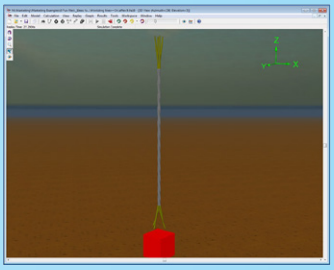
We didn't have time to write a decent application article. So we've included some taster screenshots to give a sense of some of the more unusual (and fun!) applications OrcaFlex is used for:



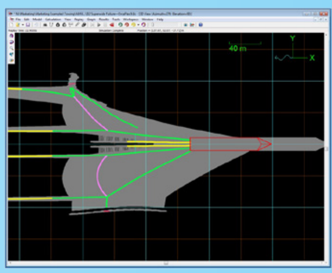
Aquaculture
OrcaFlex has been successfully used to analyse fish farms – robust, quick and reliable model building is best done with pre-processing scripts.



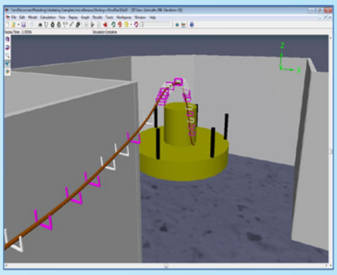
Mars!
Just for fun, here is a pipe buckling on the surface of Mars! Not that we have any users there – yet!



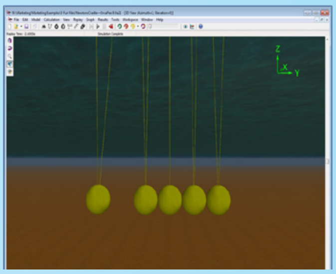
Spinning box
Here we've wound 4 lines clockwise around each other. Once the imposed moment is turned off, the system slowly unwinds.



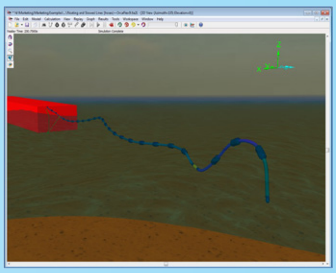
Superwide Failure
OrcaFlex models the consequence of rigging failure on what is otherwise a simple 2 streamer symmetrical model.



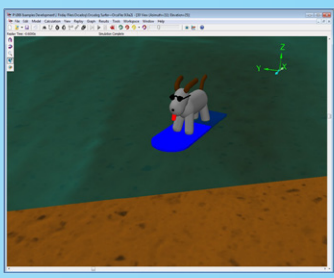
An on-shore application
Supports used in a way we never anticipated – to model a line production route in a factory!



Newton's Cradle
Heavy balls on the end of light string – a classic!



Floating Lines
All manner of floating lines are no problem in OrcaFlex – this one even has a little whiplash at the end!



Surfing Dog!!
And the legendary OrcaDog – in surfing mode ;-)

Here is an up-to-date our list of agents and their contact details (also at www.orcina.com/ContactOrcina):

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The OrcaFlex Blog

For some time now we've been blogging about OrcaFlex to complement our other channels. If you're interested, then see www.orcina.com/blog. We set it up primarily to seek feedback on possible new developments, but we also write about new releases. But if it's technical support that you're interested in then that's always better directed to orcina@orcina.com.

Did You Know...

(or stuff you might have wished you'd known sooner!!)

a) ...that in the wireframe view, <alt+left mouse click> **zooms in** at the mouse pointer. And, in keeping with Windows conventions, <shift+alt+left mouse click> zooms out again!

b) ...that the usual Excel spreadsheet controls of <ctrl+r> and <ctrl+d> will **copy the data** in the top left cell to, respectively, all highlighted cells on the data form to the right and all rows highlighted below.

c) ...if you don't like the **order of the Line Types** on the Line Type Data form or of the Vessel Types on the Vessel Type Data form, these can be re-ordered by clicking and dragging in the Model Browser.

d) ...the **order of objects** shown in the All Objects Data form is per the order of those objects in the Model Browser, *when the Model Browser is Viewed as Types.* So a re-order there will persist back to the All Objects Data form.

e) ...that if you want a new Vessel or Line **Type which is only slightly different** to an existing one (and not to use the default data), then use the Model Browser to copy and paste the existing type, thus duplicating it. Then make any changes necessary to the new Vessel / Line Type.

f) ...for **overlapping** objects in the Shaded View, the bottom object in the Model Browser view by types list is drawn last and is therefore the one seen. Re-ordering these objects in the Model Browser (view by Types), will cause the object newly at the bottom of the list to be drawn and seen once a 3D View refresh is forced through a screen refresh (a move or zoom).

g) ...there's a new option for Shaded Graphics called **Fill Mode** (shortcut Ctrl+4). When set to Solid, the Shaded Graphics is as before. When set to Mesh, only the edges of the mesh triangles are shown. This can be useful where it's desirable to see what's going on inside another object (eg., a J-tube pull).

h) ...that if you right click on the Select Results form the option **Keep Open**, once checked, keeps the Select Results form open to allow several results to be *sequentially* obtained. Without 'Keep Open' toggled on, you can still *multi*-select results for display.

i) ...having selected Values for Static Result or Time History, you can add **further results** to the same spreadsheet by selecting the new result and using <Ctrl+click on Values>!

j) ...that if you stop a replay, you can **Locate** an object of interest. Then you can Start Replay again, and track it.

k) ...that through Graph Properties you can plot +/- *n* **standard deviations on range graphs**.

l) ...that **time step** contributes to the accurate representation of the frequency-dependent added mass and damping **impulse response function?** You need both a long enough cut-off time, and a short enough time step, to represent your IRF properly (which is a natural consequence of numerical integration!).

OK, that's enough for now – we might even have made up for not including a Did You Know section in the last newsletter 😉!

OrcaFlex User Group Meetings

Since the last newsletter we've held the 2014 OrcaFlex UGMs. These annual events are held between September and December in Houston, Rio, Aberdeen, Oslo / Stavanger (these alternate each year), Amsterdam, KL, Singapore and Perth (WA).

In addition to the standard 'What's New in OrcaFlex', the following topics were presented: Pipelay modelling with Supports, alternative applications for Supports and some convergence hints and tips. The presentations for these can be found at www.orcina.com/Support/UserGroup, along with an index to all the presentations from past years.

Please see www.orcina.com/UpcomingEvents for the most up-to-date info on these UGM events.

Orcina Out and About *Exhibitions and Training Courses...*

As well as the usual mix of Open and client-specific training courses (and UGMs!), 2014 saw us exhibit at: OPT, Oceanology, OTC, OMAE, ADIPEC and Subsea Lifting. We also visited: OTC Asia, All-Energy and DOT.

For 2015 we're exhibiting at: Subsea Expo (Aberdeen), OPT (Amsterdam), OTC (Houston), OMAE (St. Johns) and Offshore Europe (Aberdeen), and the usual round of UGMs will occur between September and December.

In the next newsletter

The list below shows some of the features which we're either working on or currently considering for the next releases of OrcaFlex. This is just a short list: there are many other improvements we add in each development cycle. But, as ever, our development list depends largely on client feedback. User suggestions, especially when accompanied by the reasons a feature is felt important, are always appreciated. And of course whilst we'd really like to please 'all of the people all of the time', in reality this is not possible - but we hope that we mostly get it right!

Here are the things currently being considered:

- Frequency Domain
- Advanced constraint modelling
- Line results additionally at nodes
- Line Payout
- Restarts
- Better lateral seabed modelling
- Line pressure / thermal load effects
- Software-based licencing (ie., without dongles)

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