Ultra.news

Our Feature Presentation

If the thought of running your own business sounds liberating, guess again. For those of you dreaming about "being your own boss", our feature presentation for this issue can definitely shed some truth on this idealistic state.

Never in the history of Ultramarine has Ray Nachlinger taken relaxing two hour lunches, left early to go golfing on a Monday afternoon or even purchased court side season tickets for the Houston Rockets, (however if he feels the need, we'll be behind him all the way!)

In a typical week, Ray will work 60 to 70 hours, including weekends. A vacation you say? What's that? More often than not, working vacations are the norm. But when you have clients literally all over the world, you might find a way to add a day or two to your business trip. But it wasn't always this way; here's a little history:

Ray was born in Taylor, Texas which is about 40 miles northeast of Austin. His parents moved into Austin when he was 14 years old.

He graduated from Austin High and went on to the University of Texas where he earned his BS in Engineering Science and his MS and Ph.D. in Engineering Mechanics all by the age of 23.

He married his high school sweetheart, Ann, in the summer of '65. They have one daughter who is getting married next spring, so if he seems a little short-tempered, you now know why.

In 1968, they moved to Houston where he worked at the University of Houston teaching Engineering Mechanics. But, while teaching can be emotionally rewarding, earning a living wage is as well.

Ray started consulting for Brown

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http://www.ultramarine.com adds a "help desk"

In case you haven't been 'surfing' lately, you've missed the latest addition to the Ultramarine web site. We're dubbing this new section the "help desk". What is a help desk, you ask? Well, let me explain by example.

Let's say your boss comes into your spacious, plush office and politely asks if you have the time to work on a transportation analysis using MOSES. You say, "Sure, I'm glad to take on the responsibility." The only problem here is that you have absolutely no idea what constitutes a transportation analysis. So what to do now? Start cruisin' the web.

When we say 'cruising the web', we are not suggesting that you search for remote islands on which to take your next vacation. What we *are* suggesting is that you surf on over to our site and check out the new help desk.

It is easy to get to, just type in http://www.ultramarine.com in your browser, click on the User Information button and then click on the Help Desk button and you're there! Here's the short list of what's available:

- **How to cope with MOSES**
  MOSES Overview
  How MOSES Works
  What Do You Mean, a Language?
  Implications of a Model
  What is an Environment?
  What are Connectors?
- **How to do:**
  Hydrostatics and Ballasting
  Seakeeping
  Jacket Launch
  Lift, Lower & Upending
  Loadout
  Using Our Tools
  Mating
  Mooring
  Transportation
  Vessel Modeling
- **Questions about Details**
  General Things
  Modeling
  Compartments
  Equilibrium
  Frequency Domain
  Time Domain
  Structural Analysis
- **Useful Tools**
  Automated Analysis of Jacket or Deck Installation
  General Purpose Macros
  Automated Tanker Mooring
  A Library Of Vessel Models
- **Examples to go by**
  Samples
  Tests

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What's New in the News

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& Root in 1972. He converted a room in the upstairs of his house and made it his office. For those of you who read our feature presentation on Ann Nachlinger, this is the same office she has now taken over.

From 1973 to 1978 Ray did a number of consulting jobs for various oil companies. Finally, in July of 1978, Ultramarine was incorporated; the company had an office outside the house and they were in business.

Some of the "old-timers" might remember the names PLAP, MARVAN, OTTO and OTIS. These are the programs Ray wrote in the early days. They are technically still around, but in 1986 each of these programs and several other components were combined into one program known as OSCAR II.

In 1989, the most advanced program for the analysis of all sea vessels was developed. It's name is MOSES, standing for Multi-Operational Structural Engineering Simulator. With each release, MOSES capabilities are fine tuned to make it the only program of its kind worth using.

But don't be fooled by this summary of Ray. He is a man who knows how to have a good time. He can host an elegant dinner party one night and drink beer out in the country the next day. His hobbies include reading historical books, magazines, watching the "New Yankee Workshop", taking naps and doing "honey-do" jobs. Not the most exciting life, but one that definitely suits him.

Working with Ray is, well, it's interesting. You'd better be on your toes at all times. It's a great learning experience and if you pay attention to what he says, you'll be amazed at the things you can learn.

Next time: Roger Burger

What's New in Rev. 5.05

Since this is quite early in the release cycle, it is almost impossible to predict the general nature of this release, but it is anticipated that it will be a minor one. The following paragraphs detail the changes in the following categories respectively:

- **What Answers Will Change**
- **Pulleys**
- **Panel Pressures**
- **Panel Mapping**
- **Miscellaneous Changes**

The manner in which strip theory panels are mapped to points has been changed. In the past, the loads on all segments were mapped into all of the points of a station. This has been changed to be consistent with diffraction theory, i.e. the loads from a segment will now be mapped to the closest two points. As a result, any structural analysis of flexible vessels which used strip theory will change for the better.

Over the years, there has been an occasional need to model a pulley. Two instances spring immediately to mind: first when one has a line which passes through a pulley and back to a body, and second to correctly model the fact that an anchor line passes through several pulleys before it begins its decent to the ocean bottom. In REV 5.05, we have added the concept of a "Pulley Assembly" which can account for these effects.

One can now have information about the frequency response of the average pressure on panels. These pressures can be written to a file for use elsewhere, or you can post-process them directly.

In the past, our automatic meshing scheme worked quite well for plate models, but often had problems mapping things correctly when a vessel was defined via a stick model. To minimize these difficulties, we added several options to the M_PAN_FIX command.

The &REP_SELECT command now has the options -PANEL and -MAP for selecting map names and panel names. The -MAP option works on the &STATUS MAP and &STATUS N_MAP commands. The -PANEL option works on the HYDRO_SUM PANEL command.

The PICTURE command has a new option, -SHRINK which causes panels to be contracted toward their center a small amount. This is useful when looking for missing panels or when using color to select in panel pictures.

The plate stress report has been changed. In the past, we reported membrane stresses and bending moments/length. Now, we report membrane and bending stresses.

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- **How MOSES Deals With:**
  Processes
  Time Series, Spectra & Extremes
  Solving Equations
  Mooring Lines
  Assessing the Integrity of a Body Subjected to a Seaway

- **Hardcopy Documentation**
  Printing your own Manual
  Downloading Manuals
    MOSES
    OSCAR II
    ISAAC

- **MOSES Verification**
  A Verification Document is available where MOSES results are compared with results for the same problem obtained by other means.

- **On-line MOSES Reference Manual**
  Files For Reading
  Big File For Searching & Printing

- **Miscellaneous Technical Information**
  Various technical papers

As you can see, this "help desk" has the potential to provide you with a ton of information, without your even having to pick up the phone!

However, we haven't forgotten our roots. Not so long ago, we didn't even have internet access, much less a web page. Cruising the web was something for PC people who had a lot of time on their hands. Now, at least to us, it is an important tool for *anyone* in search of information on *anything*.

In short, we realize that not everyone has had the time to adjust or even get access to the Internet. So if the information superhighway isn't your "speed" just yet, don't worry. This help desk, along with the rest of our web site, will be included with the next release of our software on CD-ROM so that you won't have to "cruise" farther than your own desk.

As with all our products and services, we want to hear your comments. If there is any information that you would like to see on our site (within reason), let us know. Simply e-mail us at *support@ultramarine.com* or leave us a comment on our web page.

Frequently Asked Questions

Q: How do I calculate the natural period of a vessel?

A: When dealing with a free surface and a vessel moving in it, there really is no such thing. The added mass changes as the vessel moves, and total mass is an integral part of the vessels motion behavior. You can however, determine the period of peak response for a particular degree of freedom (such as roll) by looking at the response amplitude operators calculated by the program.

Q: How is the phase angle reported for RAOs measured?

A: We do not view the phase angle as having a lead or lag. We represent the sea as the cosine of the quantity omega time plus phi. Then, the phase angle is the tangent of the imaginary part divided by the real part. In other words,

water surface = cos(wt+phi)
phase angle = arctan(Im/Re)

The response is given by

r = Rcos(wt+phi1)

where the wave is

a = Acos(wt+phi)

Because the responses are RAO's, the amplitude A is 1. Now at the global origin, phi1 is zero but if the vessel is at some arbitrary global x,y position, and/or the axis system for the body isn't at amidships/cg or wherever you are used to, the wave at that "favorite" point will also have a phase angle phi1. If you want the phase angles relative to the wave at your preferred reference position, you will have to place the vessel so that this point coincides with the global origin.

Q: Why do the answers change from one program version to the next?

A: We are always striving to make our products better. Aside from correcting errors in the software, we are always on the prowl for better, more precise numerical techniques. When these changes are made, the answers between program versions deserve to be different. While we have great sympathy for the engineer trying to maintain consistent results from one project to the next, we truly believe the latest versions provide the better answers.

Q: I have a system composed of several "things". Should I model them as a single body with several parts, or as separate bodies?

A: Unfortunately, the answer here depends on what you are interested in investigating. First, bodies are considered to be rigid (except when using generalized coordinates). Thus, if there is to be relative motion between two "things", then they must be separate bodies. Even it there is no relative motion, there are times when you may want to use separate bodies. Suppose that you are interested in the forces which hold two things together. If these two things are parts of a single body, there is no way to "look" at the connecting forces except by doing a structural analysis. If, however, these things are modeled as two bodies connected by some system of connectors, then the connection forces are readily available. Remember, however, that these connection forces are computed assuming the bodies to be rigid, so a stress analysis will yield somewhat different results, depending on the flexibility of the bodies.

Q: When reporting motions using the FR_POINT command, what coordinate system is involved?

A: The body system of the body containing the point. Normally, one should specify a point name on the FR_POINT command to define the point of interest. Thus, MOSES will get the coordinates in the system it wants, and it will know the body being considered. The results are reported in the body system. If you are interested in global motions, you can use the PMOTION command.

Q: When I issue the command TDOM, I get a message "CONVOLUTION KERNEL HAS BAD PROPERTIES". What does this mean?

A: In general, MOSES uses an inverse Fourier transform to account for the frequency dependence of the added mass and damping in the time domain. The result of this procedure is that the equations of motion are no longer differential equations, but integro-differential ones. The numerics of this inverse transform are quite sensitive to the shape of the added mass and damping. We do our best to compute the inverse, but we must deal with the data at the discrete points you used in computing the hydrodynamic pressures. Since the form of the kernel can have important consequences on the motion of the system, we check our computation. In particular, we compute the Fourier transform of the kernel and compare it with the original damping matrix. If the comparison is not good, we give this warning. Normally, the warning can be safely ignored. If, however, you get "bad results" (instabilities, large motions, etc.) you better heed the warning. The "fix" here is to not use the convolution, but in its stead, use an added mass and damping matrix at a single frequency. Normally, one chooses the frequency of the mean period of the sea being applied.

Q: I have a strip theory model, how do I convert it to do a three dimensional diffraction analysis?

A: Normally, this is easy. You need only to change:

```
PGEN -DIFTYPE STRIP
```

to

```
PGEN -DIFTYPE 3DDIF
```

In some cases, there will be no -DIFTYPE option. Here, you need to add one specifying to use diffraction, as the default is to use strip theory. Now, you probably also need to add the command:

```
&PARAMETER -M_DIST XX
```

which instructs MOSES to refine the panels which will be generated so that the maximum dimension of a panel is less than "XX" feet or meters long. You can look at how MOSES generated and refined the panels by issuing the command:

```
&PLTMODEL MESH
```

The above procedure will not work if the original model has several pieces which intersect (or almost intersect). With diffraction, the interaction of the pieces is important and you need to start over with a new model.

Q: When I have multiple bodies, how to I arrange the system in space?

A: This is perhaps one of the more difficult tasks which one has to perform in MOSES. The simple answer is that you use the &INSTATE command. You need to specify the location and orientation of each body. There are several different ways of doing this, but perhaps the easiest to see is:

```
&INSTATE -LOC BOD1 X1, Y1, Z1, RX1, RY1, RZ1 \
        -LOC BOD2 X2, Y2, Z2, RX2, RY2, RZ2 \
```

Here, we are specifying the global location of the body origin of each body with the coordinates X1, Y1, ... Z2. To specify the orientation, we specify the Euler angles of each body, RX1, ... RZ2. Each of these are successive rotations. These are defined by first assuming the the global and body systems are aligned. One first rotates the body about the body Z axis an amount RZ, and then rotates it about the body Y axis an amount RY, and finally about the body X axis an amount RX. At the conclusion, the body is properly positioned in space.

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Recent Projects Using MOSES

- MOSES was used by Barnett & Casbarian to perform intact and damaged stability calculations on the Shell URSA TLP.
- MOSES was used for a transportation analysis of Shell's Enchilada deck designed by Alliance Engineering.
- MOSES was used for an installation analysis of Mobil's Flare Buoy in Equatorial Guinea.
- MOSES results were used by Sargent and Herkes, to design an attachment system so that a small push-boat could be attached to a larger tank barge. The main objective of the analysis was to make sure the connections remained taut during transportation.
- MOSES was used for a relative motion study of two tankers moored side by side with a turret moor.

Odds 'n' Ends

Our visitors for Training and Meetings

In September, Mr. George Thompson from McDermott U.K. was here to work with us on the preparation of a three dimensional plate element model and structural analysis of a derrick barge in Baku, Azerbaijan.

In November, Mr. Einar Rygg from Global Maritime A.S. in Norway was here for a week of training. While we hope he learned a lot about our software, we also want him to know how much we enjoyed his visit.

In December, we again had guests for training, this time from Korea. Mr. J. T. Jang, an agent for Ultramarine who works for SACS Korea came to Houston and brought Mr. Jong-Gab Kim, Mr. Gwang-Gi Min and Mr. Jung-Ho Kwak from Daewoo Heavy Industries. Mr. Kim, Mr. Min and Mr. Kwak were here for two weeks. We were very pleased they could be here and we hope they enjoyed their stay in Houston, Texas.

I would also like to personally thank Mr. Kim, Mr. Min and Mr. Kwak for our Korean speaking lessons. Although I doubt if Pattie, Georgina and I are ready to be let loose on the streets of Seoul, it was fun to learn a new language!

Welcome New Users and Thanks for Upgrading!

Argonautics
Sausalito,California (Upgrade)

Daewoo Heavy Industries
Koje Island, Korea (New User)

Sedco-Forex
Montrouge Cedex, France (New User)

Technip
Kuala Lumpur,Malaysia (Upgrade)

Umoe Haugesund
Haugesund, Norway (New User)