Partner Spotlight: DSA

Dean Steinke, Director of Operations, discusses dynamic analysis software, ProteusDS, available through the Altair Partner Alliance.

APA: What prompted the development of your software? What problem(s) is ProteusDS meant to solve?

Dean: In the spring of 2006, graduate Mechanical Engineering students at the University of Victoria, Ryan Nicoll and myself were toiling away in the Subsea Robotics laboratory when we realized there was a need for a streamlined and cost effective approach for simulating how flexible structures and ocean technologies behave in harsh environments. We saw that the technologies we had been working on for dynamic analysis with our supervisor, Brad Buckham, at the university had commercial potential in many ocean sectors.

That summer, Dynamic Systems Analysis Ltd. (DSA) was founded with the mission to bring dynamic analysis to the masses through consulting and numerical modeling software. Shortly thereafter we began developing the ProteusDS software framework.

In 2011 we began licensing ProteusDS to select customers. In 2013 we began commercializing ShipMo3D. ShipMo3D is a complementary maneuvering and seakeeping software which interoperates with ProteusDS.

APA: What are the benefits of using ProteusDS for dynamic analysis?

Dean: The feedback we receive is that ProteusDS is much quicker to get up and running compared to our competitors; our library-centric approach and open input file framework makes manipulating simulations quick and easy. The ability to manipulate the software through our API is also a big seller.

Our job is to make our software solve problems efficiently so that our users can focus on their businesses. We pride ourselves in providing personal support and will adapt the software quickly to the needs of our users.

APA: Are there any unique applications that ProteusDS works for that your competition cannot?

Dean: The heart of ProteusDS is the capability to model flexible structures such as mooring lines, risers, and pipelines in marine environments. ProteusDS uses a higher order cubic-spline finite element cable model which can model high amounts of curvature with large element sizes. This means faster simulation speeds and more accurate results. DSA has completed projects where real-time interactive FEA has been achieved.

ProteusDS can model prismatic, revolute, universal and several other types of constrained connections between floating and submerged structures. This technology reduces the number of degrees of freedom required to be solved and enables the software to simulate many challenging applications such as offshore cranes, articulated tug-barges, launch and recovery and piles.

In marine renewables, one of the key differentiators in ProteusDS is our turbine model, which is very useful for determining turbine loads on tidal energy platforms. This model enables us to rapidly assess the response of platforms to hundreds of wave and current loading scenarios. The model can also be used for floating offshore wind.

Proteus DS also has the ability to input turbulence data or time and spatially varying current information into a 3D current domain, which is very useful for many applications such as tidal energy, aquaculture and moorings. The data may be generated from hydrodynamic models (e.g. FVCom), CFD (e.g. AcuSolve), or synthetic turbulence generators (e.g. TurbSim).

ProteusDS has an extensive set of capabilities that give us the ability to model fin-fish aquaculture farms quickly and accurately (i.e. finite element net model, net wake shielding model, net self shielding model, variable buoyancy floater model, etc.). We use ProteusDS to ensure fish farms meet the requirements of the Norwegian Standard NS9415 in terms of mooring loads and net deflections.

APA: How much time does it take to learn and start using ProteusDS?

Dean: The feedback we receive is that ProteusDS is much quicker to get up and running compared to our competitors. We've built our tutorials to be accessible, moving from the simplest cases which take 5-10 minutes to set up to more complex real-life scenarios which can take up to an hour. Within a day of using the software, users can actually begin to set up their own simulations. ProteusDS offers intelligent code completion and built in documentation, thus allowing the user to learn how to use different features without having to go digging for the software manual. Tutorials, tutorial files and manuals can be found on our website.

APA: What's next for ProteusDS … what can we look forward to?

Dean: DSA is continuing to develop ProteusDS heavily for use in the expanding aquaculture industry. We are planning a big release with key features needed for the aquaculture industry in the coming months. We'll be attending the OMAE event in Norway this year as well, presenting a paper on these advances.

We have a lot of new features in the pipeline as well. A few of which will greatly increase simulation speed in certain cases. Secondly, we will be introducing contact dynamics between lines and between rigid bodies. This development is important for launch and recovery, offloading and other offshore applications.

In 2017 DSA will be travelling across the globe more than ever before to attend the industry events that are important to our customers. To find out where our team will be please visit dsa-ltd.ca/2017-events

APA: What are the biggest challenges or problems that customers in your target market face and how do you address their needs?

Dean: Our clients work in one of, if not the most, challenging environments in the world, predicting how a structure or systems will react in this environment is critical for the effective device development and success. The number one question we are asked is, "How will my "fill in the blank" respond to current, wind and waves?". We help them answer that question with ProteusDS. With ProteusDS, users can create virtual prototypes of marine, offshore and subsea technologies.

The ability to view and understand how a system will react is a big advantage in any ocean industry. It allows you to plan ahead and gain insight into how a system will react in a wide range of conditions. Determining areas of potential problems will reduce project risk and provides assurance that the design can withstand the extreme ocean conditions. Designing for the ocean environment is a constant challenge. Dynamic analysis allows rapid innovation and optimization while reducing risk to failure in the harsh ocean environment.

APA: Describe a typical workflow using LAP and CoDA.

Dean: Let's say a user wants to know how their tow fish (i.e. towed body) will behave during ship maneuvers and at different tow speeds. The first thing the user might do is use DSA's ShipMo3D that gives the user data on vessel motion.

Next, the user would build a numerical model of the towline and towfish in ProteusDS. The towfish may have foils and controllers which work together to keep the towfish at a constant altitude or depth. The foil properties and towfish mass, CG location and hydrodynamic properties are easily entered into ProteusDS. Then, the towline properties (axial and torsional rigidity, drag, length, etc.) are specified and the finite-element line model is configured. Lastly, the users, use the RAO information generated in ShipMo3D to impose vessel motion on the towline fairlead. Once the vessel, towline and towfish parameters are set in ProteusDS – layback, turning maneuvers, line tension and towfish stability may be assessed under different wave and current conditions.

Model configuration data, like the data described above, is entered into the ProteusDS Simulation Toolbox application which is DSA's pre-processing software. The software allows for quick configuration of models. Once the information has been entered and the solver has completed the simulation, users can view the results in PostPDS. PostPDS takes the data generated by the solver and allows for 3D rendered viewing and data plotting.

For more information about ProteusDS and ShipMo3D, visit the solution pages.