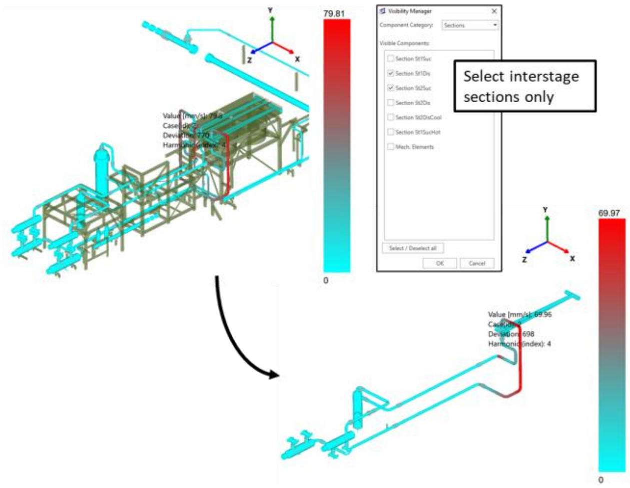
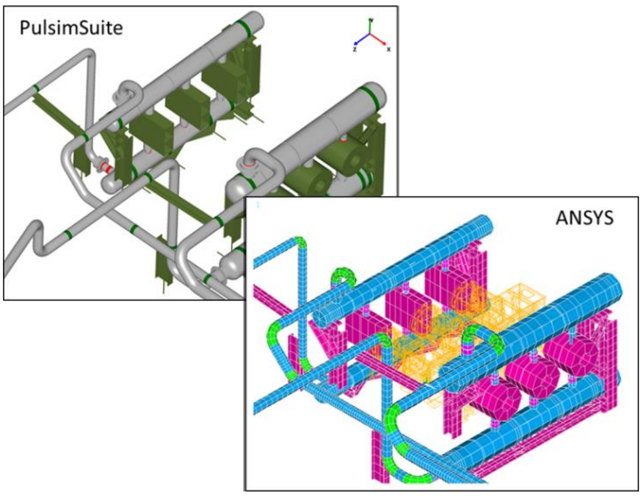
PULSIMSUITE NEWSLETTER

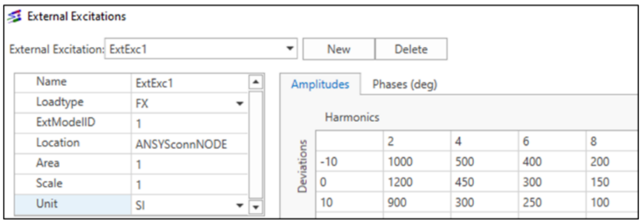
This is the PulsimSuite newsletter of Q1, 2023, presenting version 2.3.1. With your feedback, we have implemented new functionality of which we give you a brief overview here.
In this release 2.3.1, we have done some thorough maintenance on the Graphical User Interface, to keep it up-to-date for the latest (and upcoming) Windows updates. Apart from that, we have also developed new and improved functionalities on the backend of PulsimSuite, such as a more accurate model for orifice plates of large thickness, and a more intuitive method to include external models and external forces in mechanical response calculations.



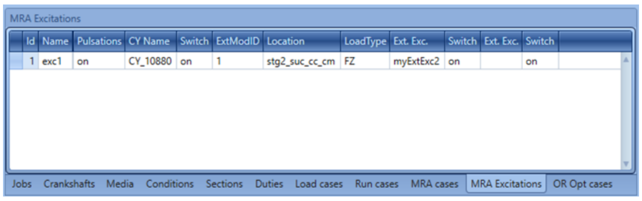
A new functionality in PulsimSuite is the option to hide parts of your model. This can be useful during the modeling of complex systems, and especially during the analysis of pulsation or mechanical results. With the **visibility manager**, you simply select the parts (Sections, Groups, Lines) of the model that you want to analyse, and the rest of the model will be hidden. The function that calculates the maximum response will only take into account the visible part of the model, of course.



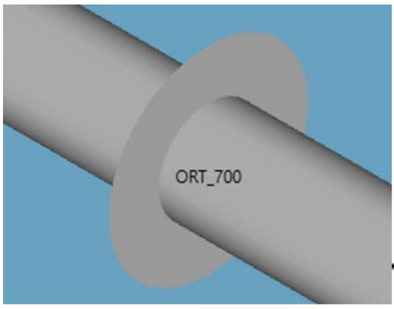
Although the functionality was already available for advanced users, the inclusion of **external mechanical models** and **external excitation forces** in mechanical simulations has been made much more intuitive, by GUI support. For this purpose, the GUI has two new tabs: One for the definition of your External Models (their names), and one for the definition of your **Mechanical Excitations**.
A SUP or JNT object in PulsimSuite can straightforwardly be connected to any ANSYS model, by specifying the external model's name and node to connect to. It is that simple! Differences in axis systems are taken care of, and possible connection nodes positioning differences are minimized by automatically moving the external model, if necessary.

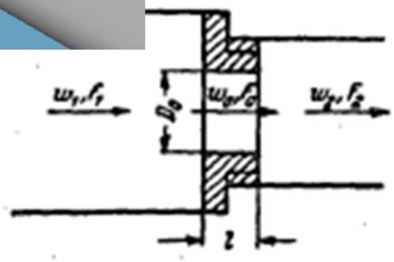


Also for the mechanical response analysis: external forces (forces that are not the pulsation-induced forces or cylinder stretch forces as calculated by PulsimSuite) can now be created with an **External Excitation** editor, which allows you to specify harmonic excitation force amplitudes and phases in a spreadsheet (copy from Excel is possible). You can also specify whether the force acts on a PulsimSuite node, or on a location in an external model.



A new tab **MRA Excitations** allows you to specify the forces you wish to excite the mechanical model with: pulsation forces, cylinder stretch forces, or forces on specific locations that you have specified yourself. If you leave this tab empty, the "usual" response will be calculated for the pulsation forces on the pipe system.





A new model was implemented for orifice plates with large thickness: **ORT**. This implementation of the model by Idelchik is a more accurate model for simulating friction at the orifice plate than the existing OR. The ORT model is valid for larger thickness/bore ratios of the orifice plate. The ORT node gives similar results as the existing OR point for the usual orifice thicknesses (10-20 mm), but ORT gives a more accurate pulsation-induced shaking force in case of high pressures (> 1000 bar), combined with different pipe diameters on either side of the orifice plate.

Table 21 - Static pressure loss (%) over the orifice plates (OR Points) in the model

Line ID	OR Nr	Bore [mm]	Press. [kPa]	Pres. Loss [kPa]	Pres. Loss [%]
	700	88.0000	3999.9680	19.33	0.48
main	710	55.0000	8101.2480	82.98	1.02

In the reporting, we have added the option to report results for the (static part of) pressure loss over all OR points in the model.

Table 49 - Separation Margin Table at Maximum RPM Case 1

500 RPM	Harmonic No.	1	2	3	4	5	6	7
Mode No.	Freq (Hz)	8.33	16.67	25.00	33.33	41.67	50.00	58.3
1	0.69	-91.69	-95.84	-97.23	-97.92	-98.34	-98.61	-98.8
2	1.66	-80.08	-90.04	-93.36	-95.02	-96.02	-96.68	-97.1
3	1.91	-77.09	-88.54	-92.36	-94.27	-95.42	-96.18	-96.7
4	2.87	-65.59	-82.80	-88.53	-91.40	-93.12	-94.27	-95.0
5	7.65	-8.25	-54.13	-69.42	-77.06	-81.65	-84.71	-86.8
6	8.73	4.82	-47.59	-65.06	-73.80	-79.04	-82.53	-85.0
7	16.60	99.17	-0.42	-33.61	-50.21	-60.17	-66.81	-71.5
8	18.79	125.46	12.73	-24.85	-43.64	-54.91	-62.42	-67.7
9	22.28	167.32	33.66	-10.89	-33.17	-46.54	-55.45	-61.8
10	23.96	187.51	43.76	-4.16	-28.12	-42.50	-52.08	-58.9
11	26.02	212.25	56.13	4.08	-21.94	-37.55	-47.96	-55.3
12	32.83	294.00	97.00	31.33	-1.50	-21.20	-34.33	-43.7

In the mechanical report, the **eigenfrequencies** part of the report now not only lists the mechanical natural frequencies of the mechanical system, but also a table is presented that shows the percentage that the eigenfrequencies are separated from each pulsation frequency (harmonic). The eigenmode-frequency combinations that are within a +/- 20% margin of an acoustic excitation frequency (the API separation margin) are indicated by a red box.

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