What's new in CAEPIPE V12.20?
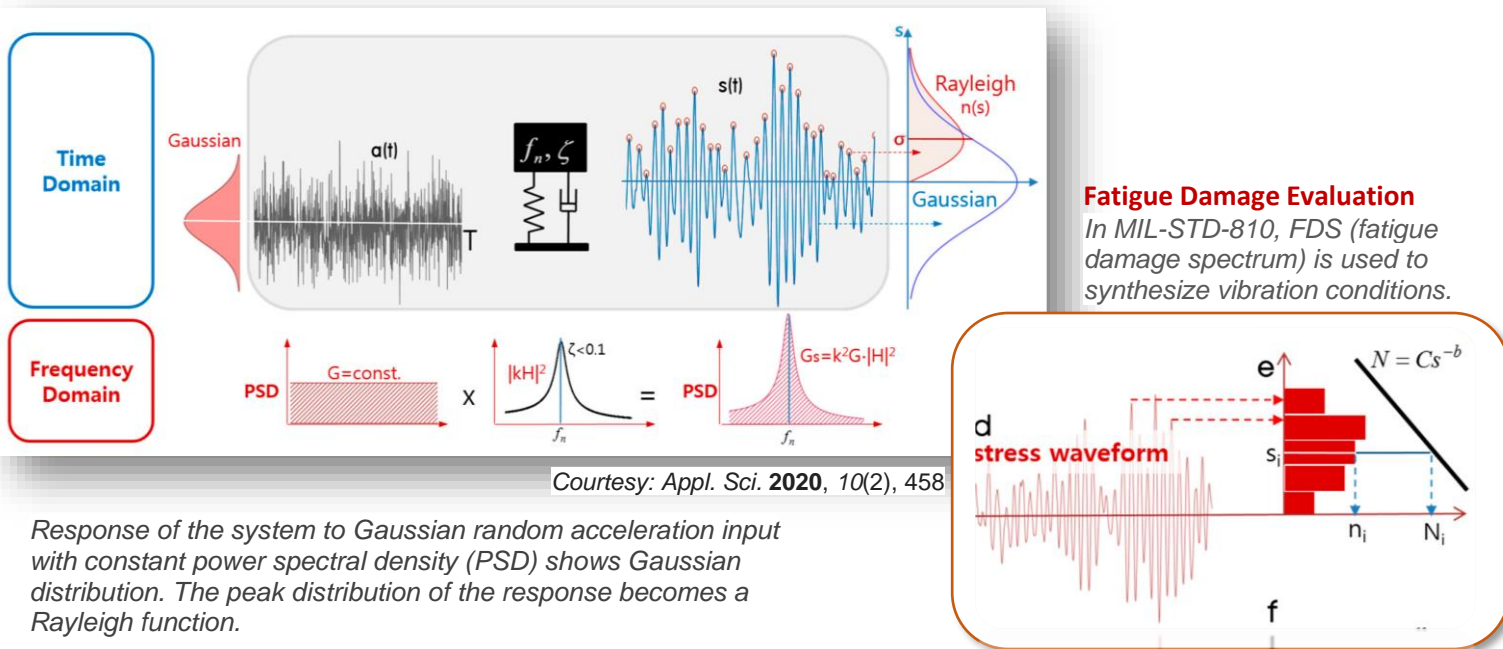
(Release date: April 10, 2024)

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Introducing...

Random Vibration Analysis

We are pleased to announce a pioneering feature in pipe stress analysis software: Random Vibration Analysis. For the first time ever, this cutting-edge capability is available, revolutionizing how stress analysis is performed on piping and ducting systems in critical sectors like aerospace and defense. Designed to tackle the challenges of random vibration loads experienced by aircraft, submarines, helicopters, and defense weaponry, our Random Vibration Analysis offers a probabilistic approach to stress assessment. By simulating real-world conditions with precision, it empowers engineers to comprehensively understand and optimize the performance of their piping and ducting systems. For details on its capability and limitations, refer to the section titled 'Dynamic Analysis' in CAEPIPE Technical Reference Manual.
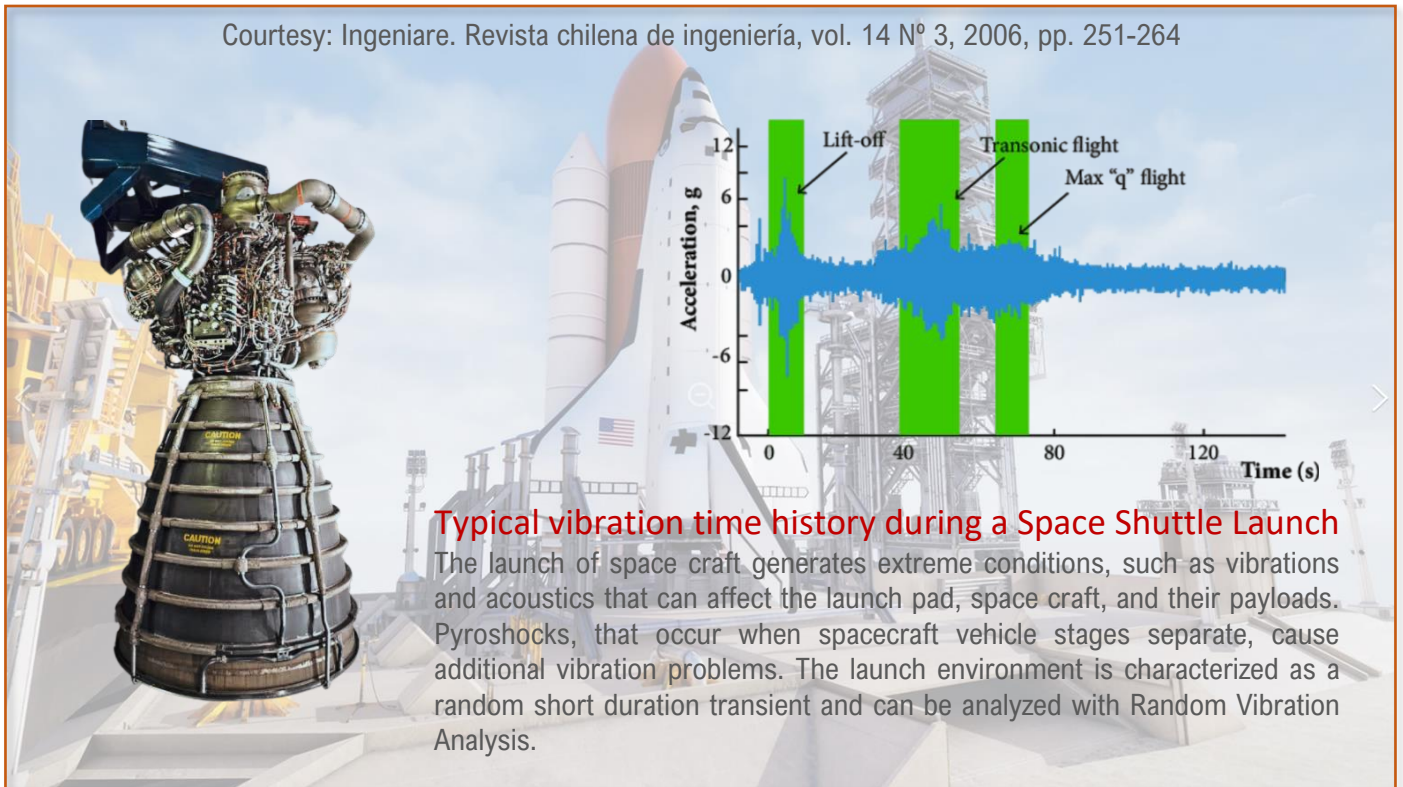

Courtesy: Appl. Sci. 2020, 10(2), 458

Fatigue Damage Evaluation
In MIL-STD-810, FDS (fatigue damage spectrum) is used to synthesize vibration conditions.

Response of the system to Gaussian random acceleration input with constant power spectral density (PSD) shows Gaussian distribution. The peak distribution of the response becomes a Rayleigh function.

Courtesy: Ingeniare. Revista chilena de ingeniería, vol. 14 Nº 3, 2006, pp. 251-264

Typical vibration time history during a Space Shuttle Launch

The launch of space craft generates extreme conditions, such as vibrations and acoustics that can affect the launch pad, space craft, and their payloads. Pyroshocks, that occur when spacecraft vehicle stages separate, cause additional vibration problems. The launch environment is characterized as a random short duration transient and can be analyzed with Random Vibration Analysis.

UPDATED CODES:

The following piping codes are updated. Refer to Piping Code Compliance section of CAEPIPE Code Compliance Manual.

- ASME NM.1 (2022) - Thermoplastic Piping Systems
- ASME NM.2 (2022) - Glass-Fiber-Reinforced Thermosetting-Resin Piping Systems (GRP/FRP)
- EN 13941-1:2019+A1:2021 - District Heating Pipes

Enhancements

- New feature is added to find the section property from the first occurance of the succeeding elements or from the first occurance of the preceeding elements when the Flange Library dialog is not able to get the section property from the current element to obtain the Flange Weight.

- "Support Load Summary" results will show the 'displacements' results for all types of supports.

- Shape Factor input field in Wind dialog is applicable only for "Velocity vs Elevation". Hence, Shape Factor input field is disabled in the Wind dialog when the option "Pressure vs Elevation" is selected.

- New feature is added to Enable or Disable Dynamic Zoom in Graphics Window while using mouse scroll button for Zoom. This option can be modified through CAEPIPE Main Frame > Preferences > Disable Dynamic Zoom.

- New feature is added for translating and rotating the graphics in Graphics Window using a mouse. In Translation mode (Pan), use Mouse Middle Button Down and Drag in Horizontal or Vertical direction for Horizontal or Vertical Translations. Similarly, in Rotation mode (Turn), use Mouse Middle Button Down and Drag in Horizontal or Vertical direction for Rotation in Horizontal or Vertical plane.

The FASTEST Solutions for Piping Design and Analysis

Enhancements (contd)..

- New feature is added for transforming Limit Stop loads from Local Coordinate System (LCS) to Global Coordinate System (GCS). Refer to the Section titled "Support Loads" under Results Window in CAEPIPE User's Manual for further details.

- MBF format is updated to be compatible with CAEPIPE Version 12.20. See Appendix A of CAEPIPE User's Manual.

- CAEPIPE User's Manual, Technical Reference Manual, Code Compliance Manual and Verification Manual have been enhanced and updated to be in line with software version 12.20. These Manuals can be downloaded from the link www.sstusa.com/caepipe-docs.php.

Bug Fixes

- Auto-refinement of Branches was adding a small element at Branch SIF locations when it is a Skewed line upon every model "Save".

- Responding to "Save changes" dialog was not performing any action when the command "Analyze" was selected without saving the model.

- For Piping Code = NONE, in von Mises stress computation, CAEPIPE was using the In-plane and Out-of-plane SIFs corresponding to the "From" Node for the "To" Node also. This bug exists from CAEPIPE Versions 5.10 through 12.10. This bug would affect results only when the NONE code is selected and two different values for "User SIF" are entered for the two ends of a component.

CAEPIPE Code Compliance Checks

Table given below lists the Piping Codes that are built into CAEPIPE Version 12.20 for Code Compliance checks with their piping type and analysis type covered.

Sl. No.	Piping Code and Description	Metallic / Nonmetallic Piping	Above Ground	Buried Piping
1	ASME B31.1 (2022) - Power Piping	Metallic	Yes	---
2	ASME B31.1 (1967) - Power Piping	Metallic	Yes	---
3	ASME B31.1 (1973) - Power Piping	Metallic	Yes	---
4	ASME B31.1 (1977) - Power Piping	Metallic	Yes	---
5	ASME B31.1 (1980) - Power Piping	Metallic	Yes	---
6	ASME B31.3 (2020) - Process Piping	Metallic	Yes	---
7	ASME B31.4 (2022) - Pipeline Transportation Systems for Liquids and Slurries	Metallic	Yes	Yes
8	ASME B31.5 (2019) - Refrigeration Piping and Heat Transfer Components	Metallic	Yes	---
9	ASME B31.8 (2022) - Gas Transmission and Distribution Piping Systems	Metallic	Yes	Yes
10	ASME B31.9 (2020) - Building Services Piping	Metallic	Yes	---
11	ASME B31.12 IP (2019) - Hydrogen Piping	Metallic	Yes	---
12	ASME B31.12 PL (2019) - Hydrogen Pipelines	Metallic	Yes	Yes
13	ASME NM.1 (2022) - Thermoplastic Piping Systems	Nonmetallic	Yes	---
14	ASME NM.2 (2022) - Glass-Fiber-Reinforced Thermosetting-Resin Piping Systems (GRP/FRP)	Nonmetallic	Yes	---

Sl. No.	Piping Code and Description	Metallic / Nonmetallic Piping	Above Ground	Buried Piping
15	ASME Class 2 (1980) - ASME Section III, Subsection NC - Class 2	Metallic	Yes	---
16	ASME Class 2 (1986) - ASME Section III, Subsection NC - Class 2	Metallic	Yes	---
17	ASME Class 2 (1992) - ASME Section III, Subsection NC - Class 2	Metallic	Yes	---
18	ASME Class 2 (2015) - ASME Section III, Subsection NC - Class 2	Metallic	Yes	---
19	ASME Class 2 (2017) ASME Section III, Subsection NC - Class 2	Metallic	Yes	---
20	ASME Class 2 (2021) - ASME Section III, Subsection NC - Class 2	Metallic	Yes	---
21	ASME Class 3 (2017) - ASME Section III, Subsection ND - Class 3	Metallic	Yes	---
22	ASME Class 3 (2021) - ASME Section III, Subsection ND - Class 3	Metallic	Yes	---
23	ISO 14692-3 (2017) - Petroleum and Natural Gas Industries - Glass Reinforced Plastics (GRP/FRP) Piping	Nonmetallic	Yes	Yes
24	EN 13480 (2020) - Metallic Industrial Piping	Metallic	Yes	Yes
25	EN 13941-1:2019+A1:2021 - District Heating Pipes	Metallic	No	Yes
26	BS 806 (1986) - Construction of Ferrous Piping Installations for and in Connection with Land Boilers (British)	Metallic	Yes	---
27	IGEM (2012) - Institution of Gas Engineers and Managers (IGEM) IGE/TD/12 Edition 2 (UK)	Metallic	Yes	---
28	Norwegian (1983) - Process design	Metallic	Yes	---
29	Norwegian (1990) - Process design	Metallic	Yes	---
30	RCC-M (1985) - Design and Construction Rules for Mechanical Components of PWR Nuclear Islands (French)	Metallic	Yes	---
31	RCC-M (2018) - Design and Construction Rules for Mechanical Components of PWR Nuclear Islands (French)	Metallic	Yes	---
32	RCC-M (2020) - Design and Construction Rules for Mechanical Components of PWR Nuclear Islands (French)	Metallic	Yes	---
33	RCC-M (2022) - Design and Construction Rules for Mechanical Components of PWR Nuclear Islands (French)	Metallic	Yes	---
34	CODETI (2013) - CODE DE CONSTRUCTION DES TUYAUTERIES INDUSTRIELLES (French)	Metallic	Yes	---
35	Stoomwezen (1989) - Dutch Power Piping code	Metallic	Yes	---
36	Swedish (1978) – Swedish Piping code	Metallic	Yes	---
37	Z183 (1990) - Oil Pipeline Systems (Canadian)	Metallic	Yes	---
38	Z184 (1992) - Gas Pipeline Systems (Canadian)	Metallic	Yes	---
39	Z662 (2019) - Oil & Gas Pipeline Systems (Canadian)	Metallic	Yes	Yes
40	NONE (for AWWA M11 applications, and for applications in aircraft, aerospace & defence industries)	Metallic	Yes	Yes

CAEPIPE Demo: Download an evaluation version of CAEPIPE from the link https://www.sstusa.com/piping-software-download.php.