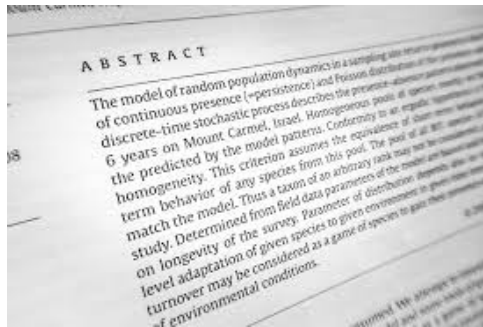


Writing a report



1

So how should I write my report ?

Basic rules :

- Use the template (word or latex)
- Respect the suggested balance (number of pages/section)
 - Abstract (1/2 page)
 - Introduction (1-2 pages)
 - State-of-the-art (3-4 pages)
 - Work plan (2-3 pages)
 - Tentative schedule (1 page)
 - List of references (1-2 pages)
- Total number of pages 10-12

2

2

So how should I write my report ?

Other important rules

- The list of references should contain only the papers you are referring to in the text (no 'floating' reference)
- Plagiarism is forbidden, if you copy a sentence or paragraph from a source, cite it, and put it between brackets ""
- Every figure should be numbered, and correctly referenced to in the text
- If a figure/illustration is copied from a source, cite it
- Footnotes are not common in our field, prefer links to references at the end of the document

3

3

Referencing examples

Analytical expressions of these optimal parameters can be derived when the main structure is represented by a single degree-of-freedom (dof) system. The first author to derive such analytical expressions was probably Den Hartog [1] in 1956. He found the analytical expressions of the optimal stiffness and damping of a TMD

[from Soubeyroux et al, 2018]

References

- [1] JP Den Hartog. *Mechanical vibrations*. McGraw-Hill Book Company, 1956. **Book**
- [2] G.B. Warburton. Optimum absorber parameters for various combinations of response and excitation parameters. *Earthquake Engng and Struct. Dynamics*, (10) 381–401, 1982.
Volume Pages Year
- [3] A.W. Leissa. The historical bases of the rayleigh and ritz methods. *Journal of Sound and Vibration*, 287:961–978, 2005.
- [4] B. Besselink, A. Lutowska, N. van de Wouw, H. Nijmeijer, D.J. Rixen, M.E. Hochstenbach, and W.H.A.Schilders. A comparison of model reduction techniques from structural dynamics, numerical mathematics and systems and control. *Journal of Sound and Vibration*, 332:4403–4422, 2013.

Conference papers

4

4

Referencing examples : the doi

The doi is a unique identifier for each publication, the link allows to access directly the website of the publisher

Example :

[33] F. Levassort, P. Maréchal, P. Boy, O. Acher, Toward more efficient matching layers for piezoelectric transducers, Proc. – IEEE Ultrason. Symp. (1) (2009) 2762–2765,
<http://dx.doi.org/10.1109/ULTSYM.2009.5442015>.

5

5

Figures and referencing

We first consider the equations of motion of the host structure without TMD with a force applied at the position and in the direction of the TMD (Figure 3).

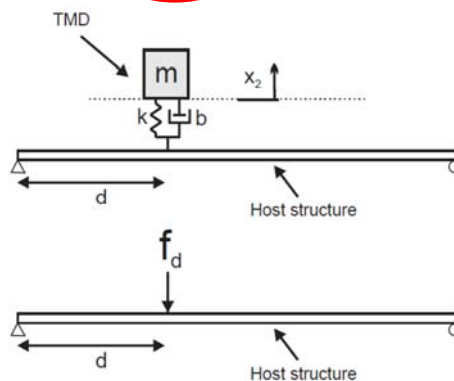
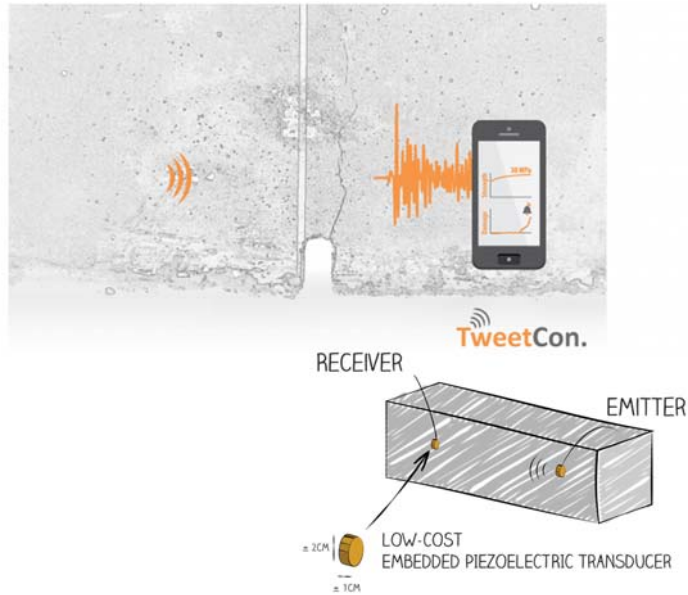


Figure 3: TMD attached to a continuous system, and host structure without TMD with force applied at the position and in the direction of the TMD

6

6

The power of illustrations



7

The power of illustrations : example

The building is assumed to be excited by the wind. This causes vibrations which can be measured with dedicated sensors such as accelerometers or strain sensors.

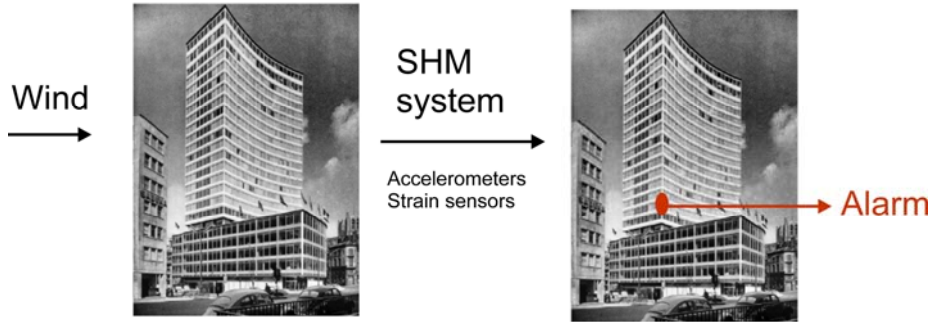
Our aim is to use the measured data from these sensors in real-time to be able to monitor the structure, i.e. to detect the appearance of damage and possibly locate where the damage has occurred.

This is an important tool to aid for the maintenance of the building

8

8

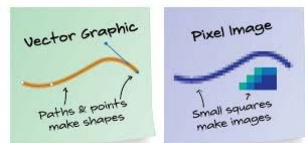
Use illustration to illustrate main ideas



9

9

Vectorial graphic vs pixel based figures

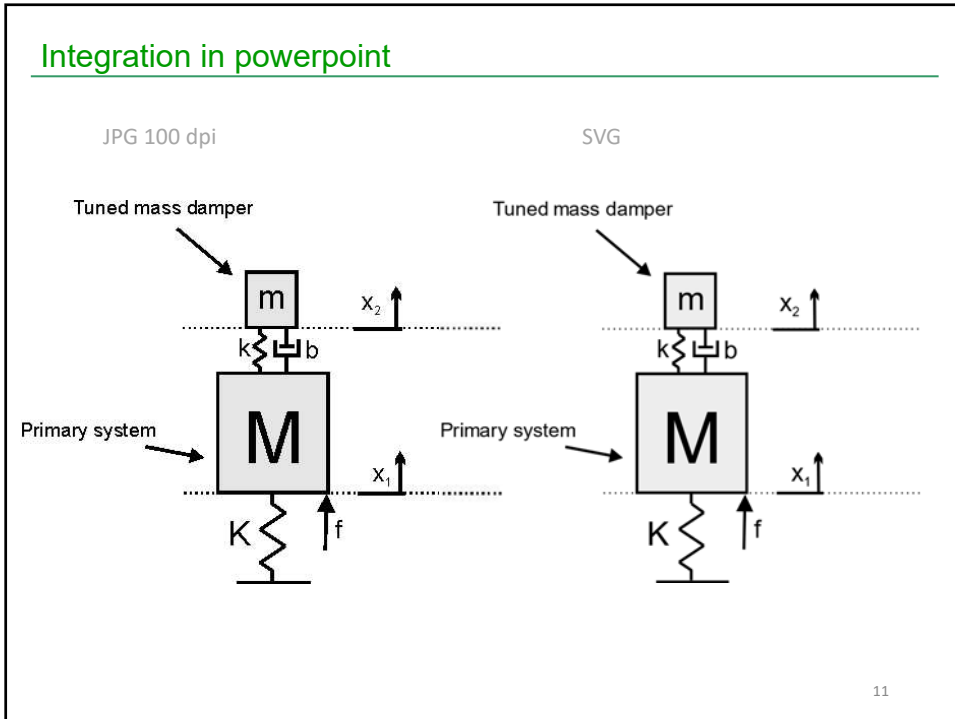


Vector graphic : eps, pdf, svg, ai, cdr, ...
(Adobe Illustrator, CorelDraw, [InkScape](#))

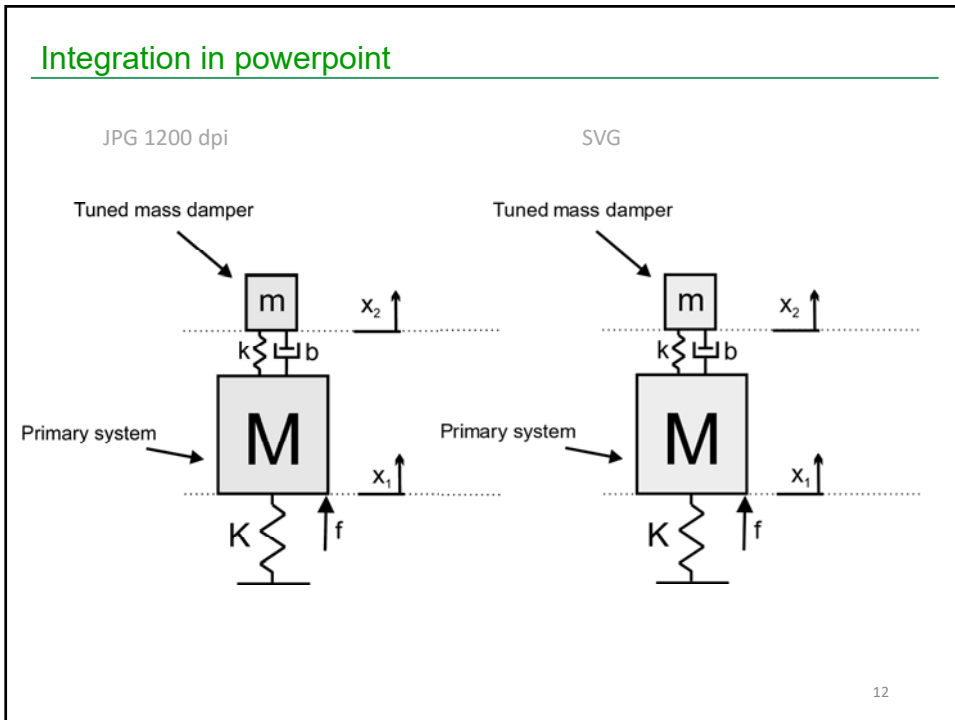
Pixel image : jpg, png, gif, tiff, ...
(Photoshop, [Gimp](#), Paint, ...)

10

10



11



12

Create your own illustrations

Interdigitated electrode pattern on polyimide film (top and bottom)
Permits in-plane poing and actuation of piezoceramic (d_{33} versus d_{31} advantage)

Structural epoxy
Inhibits crack propagation in ceramic. Bonds actuator components together.

Sheet of aligned rectangular piezoceramic fibers
Improved damage tolerance and flexibility relative to monolithic ceramic.

[www.smart-material.com]

Polyimide film with interdigitated electrodes
Epoxy layer
PZT Macro Fibers
Matrix epoxy

(with CorelDraw)

Spent some time to make your own illustrations

- Bad resolution
- Not optimal for your report

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13

Tell your story with illustrations

10V
5µs
≤150 Meas./s

DAQ (NI) PXI-6115
+18...60dB
Programmable Pre-Amplifier Smartnote

OUT 1 DAQ 2 Emitter
IN 3 Receiver 4 Amplifier 5 DAQ

14

14

Other example of illustration

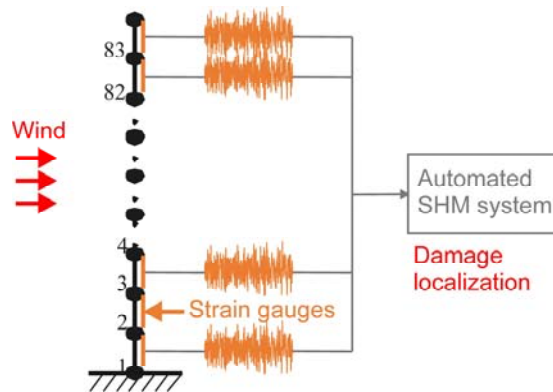
- Strain gauges are installed on the building.
- The building is mainly subjected to wind oriented in the X-Direction of the tower.
- Our goal is to detect and locate damage directly from the sensors response, without any knowledge of the model of the structure.
- Models always contain some simplification and are not accurate enough to detect the onset of damage.
- We have recorded signals on the full set of transducers at two different instants.
- There are in total 83 strain gauges, one at each level of the building and it makes. For the all the sensor 100001 values were reported.
- The first strain gauge is at the bottom of the building.
- The first set of measurements corresponds to the healthy case while we suspect that a damage has occurred for the second set of signals.

[from student presentations]

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Tell your story with illustrations



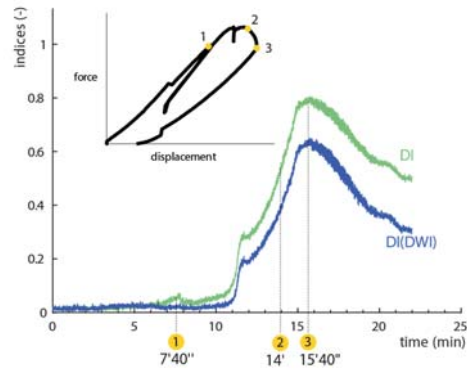
Objective : locate the damage based on output-only data from strain sensors

16

16

Graphs

- Choose the right type of graph
- Pay attention to axes labels and units
- Improve readability of the graph : highlight information (stay away from default graphs in Matlab, Excel, ...)

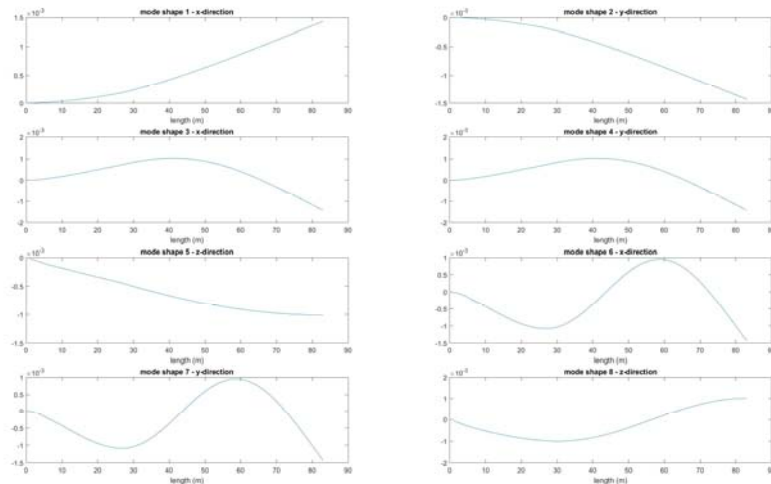


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Example : mode shapes of a cantilever beam

Initial Matlab Figures

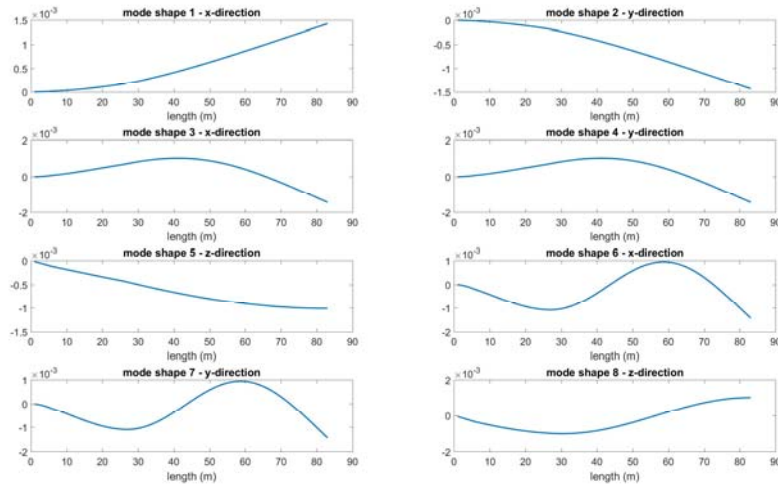


18

18

Example : mode shapes of a cantilever beam

Increase line width, font size

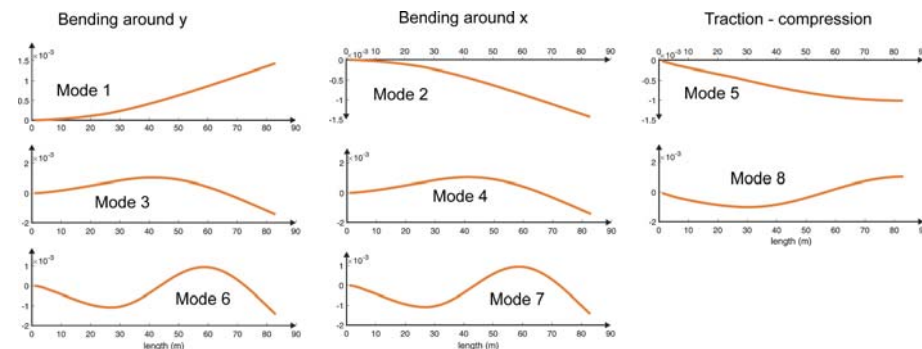


19

19

Example : mode shapes of a cantilever beam

- Reorganize
- Change axis style -> Engineering style
- Change line color

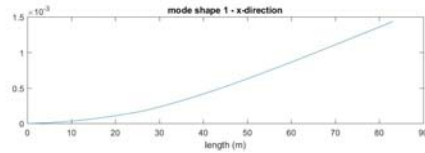


20

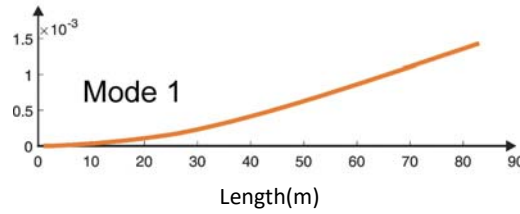
20

Example : mode shapes of a cantilever beam

Stay away from the default Matlab/Excel style to improve aspect



Bending around y

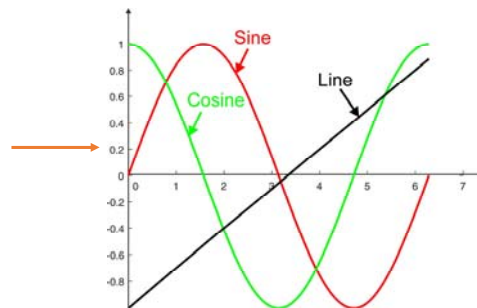
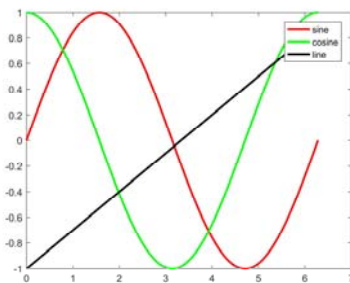


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Graphs and legends

You may consider putting legend into the Graph (use arrows)

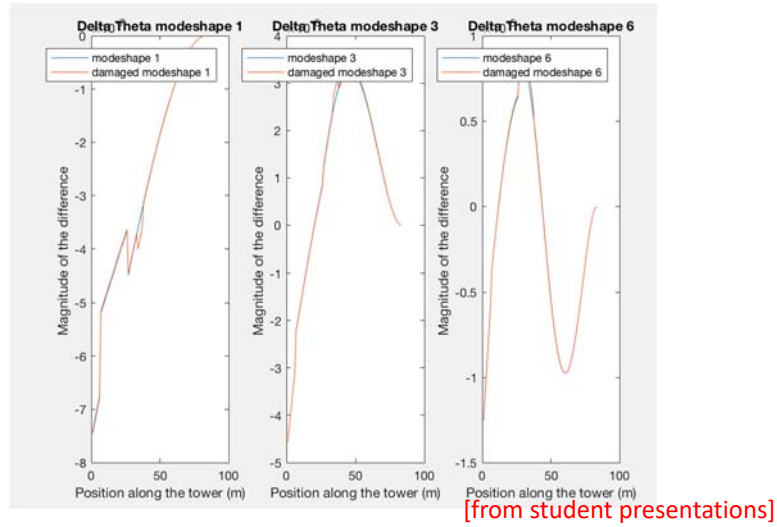


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Graphs and legends

Example of a bad use of legend

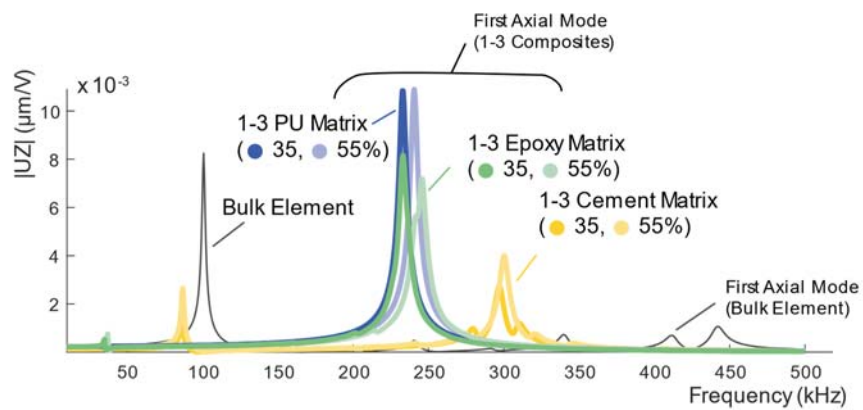


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23

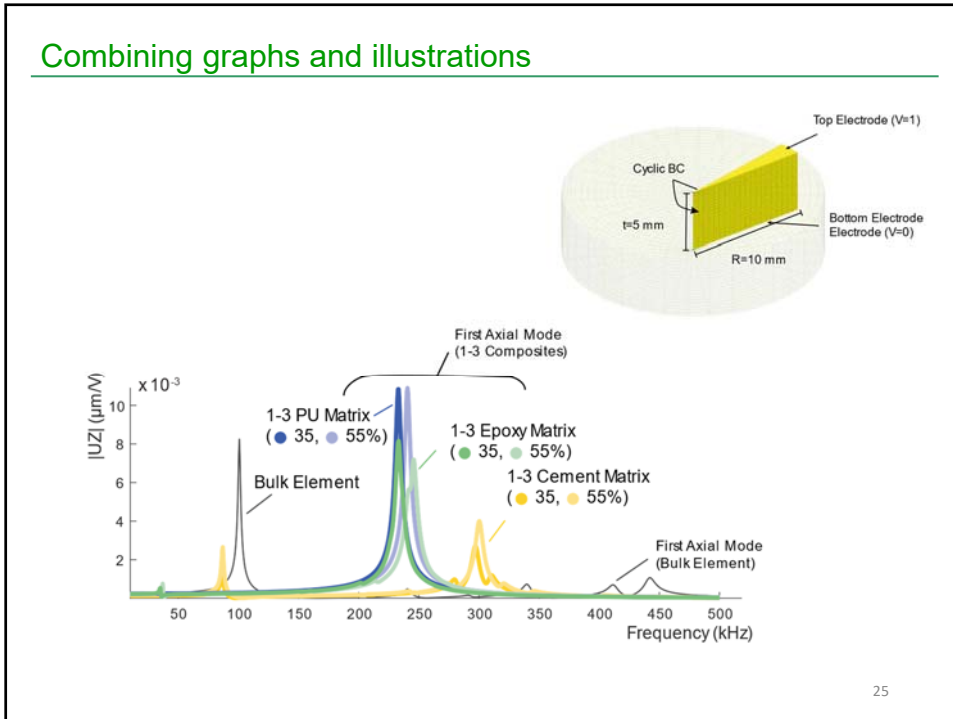
Highlight information in the graph

Tell your story in the graph

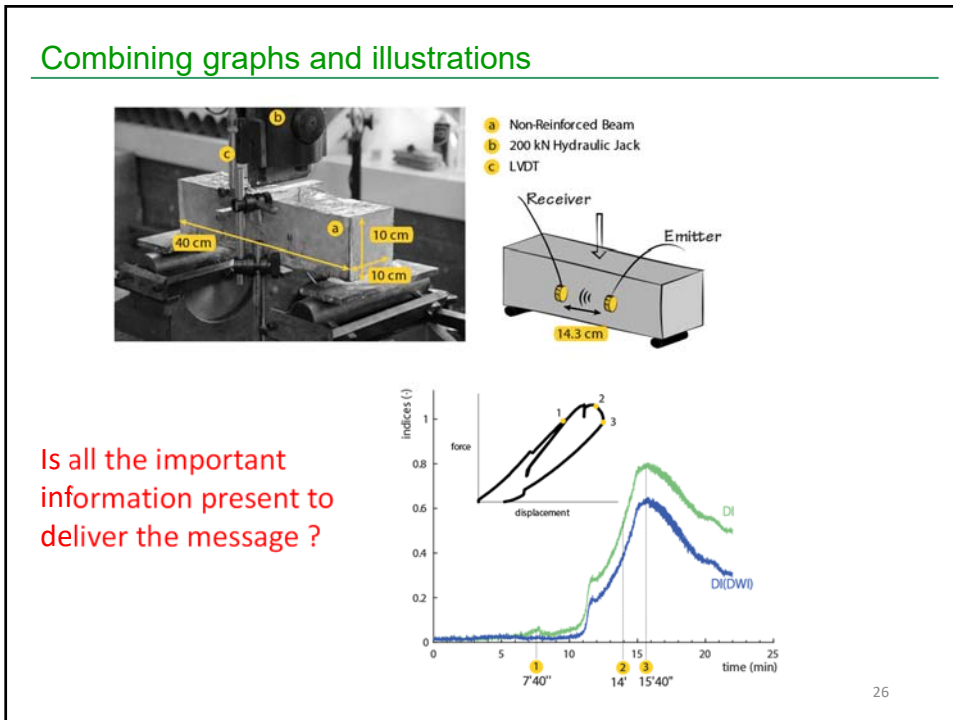


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Choosing the right graph

Jean-luc Doumont



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